

# Waste Tire Market Development Program Evaluation Final Report



California Department of Resources Recycling and Recovery

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- Michael Blumenthal, Rubber Manufacturers Association
- Serji Amirkhanian, Clemson University
- Terry Leveille, TL & Associates/California Tire Report

CalRecycle tire program staff and management contributed hugely to this evaluation and report by providing data, information, discussing past, current and future program issues and—generally—by supporting what became a very detailed review and outside commentary on their efforts. The authors offer sincere gratitude for this support and the constructive working relationship offered by all CalRecycle staff and management during the course of this project.

Finally, thank you to the numerous California waste tire processors, tire-derived product manufacturers, and others with an interest in the industry provided information, ideas and feedback through three public workshops and numerous conversations.

# Executive Summary

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## ***Project Purpose***

Officially known as the Department of Resources Recycling and Recovery, CalRecycle is a new department within the California Natural Resources Agency and administers programs formerly managed by the California Integrated Waste Management Board and Department of Conservation, Division of Recycling.\* As required by statute, CalRecycle's overall waste tire management strategy focuses on the two interrelated objectives: enforcement and market development. CalRecycle staff directed R. W. Beck to conduct this study of its waste tire market development programs to evaluate how well these programs, as currently structured and operated, are succeeding in addressing and achieving the state's recycling market development goals and to identify ways in which California's tire market development approach could be enhanced. To continue the public input practices established by the previous board structure, CalRecycle specifically designed the project to allow multiple opportunities for stakeholder input, through an advisory group and through four public workshops held during the course of the project.

## ***CalRecycle Progress to Date***

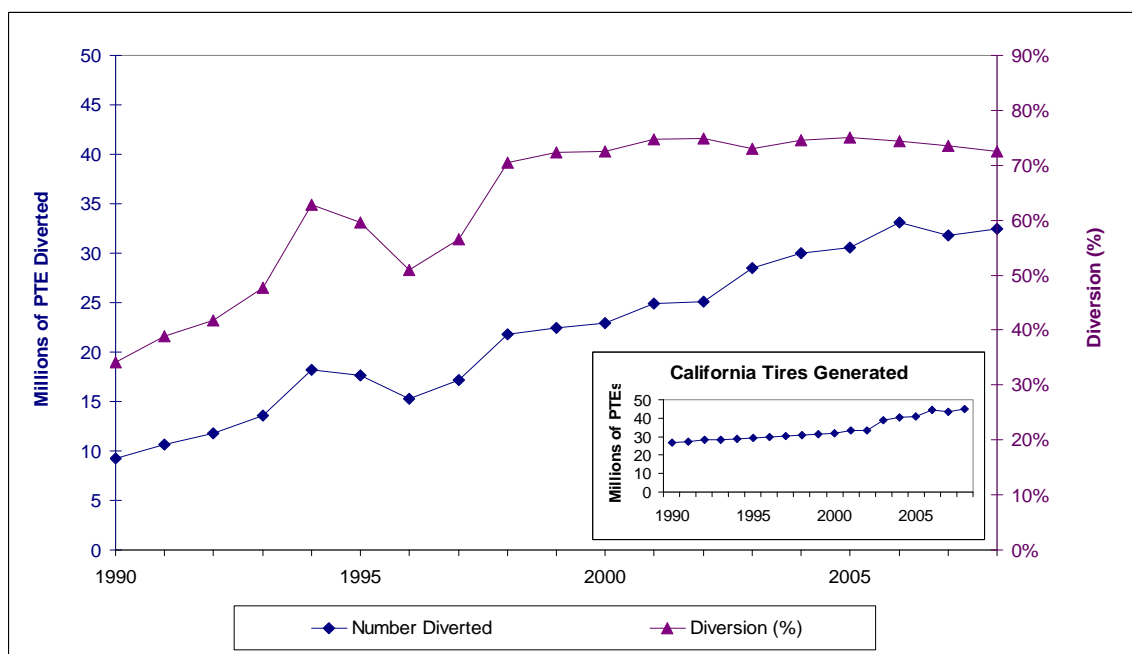
Began in the early 1990s, the CalRecycle waste tire market development program has directly contributed to the development of a highly diversified and dynamic infrastructure for marketing, producing, and installing a wide range of tire-derived products, as well as a robust tire collection, hauling, and processing infrastructure to supply those markets. As shown in Figure ES-1, in the first decade of activity the diversion rate increased from about 30 percent to about 70 percent, largely through gains made in use of tire-derived fuel and tire-derived aggregate used in landfill civil engineering applications, as well as a nascent ground rubber industry. Since 2000, the overall waste tire diversion rate has hovered at just above 70 percent, even as waste tire generation grew. Simultaneously, the market has diversified with a range of new products using ground rubber gaining ground. While a variety of factors influence industry and diversion trends, California state programs have clearly played an important role.

If not for the state market development programs overseen by CalRecycle, current waste tire market segments including TDF, rubberized asphalt concrete and other ground rubber, civil engineering and alternative daily cover (which jointly consumed 22.4 million passenger tire equivalents in 2008, or 50 percent of total generation) would be far more modest markets, if they were to exist at all. CalRecycle's tire market development program is one of the most consistently funded and resourced programs in the nation. Since 2001, the overall tire program has been funded with a \$1.00 per tire fee (of a total \$1.75 assessed on new tire purchases). CalRecycle's overall tire program is budgeted through the 2012/13 fiscal year at an average annual budget of a little more than \$40 million, with \$18.5 million on average allocated to activities defined in this report as market development.

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\* In this report CalRecycle is used to refer to current and past efforts by the agency.

**Figure ES-1. Waste Tire Diversion and Disposal Trends**



The program's key strengths are its staff and contractor resources; its regular review and adjustment of programs through the biennial Five-Year Plan process, its dedication to transparency and an open stakeholder engagement process, and its uninterrupted, sustained funding. Areas highlighted for strengthening include the need for greater coordination across programs in planning and executing activities, the need for stronger performance measurement activities, and the need to adopt and articulate a compelling strategic approach that can garner greater involvement and buy-in by industry stakeholders and better focus the wide range of efforts underway.

## Market Expansion Priorities and Targets

Table ES-1 presents recommended market expansion priorities, along with 2008 and projected 2015 market use and market penetration estimates. The projections are based on quantitative extrapolation of trends over recent years, modified to reflect short-term trends and anticipated activities. The projections assume that no key threats arise that would result in a drastic reduction of any established market segment. This includes a proposed federal rule that, if adopted, could potentially reduce tire-derived fuel demand by as much as 5.4 million PTE (or 12 percent of total generation) compared to the level used in 2008. While overall diversion volume increases from 32.4 to 42.8 million PTEs under these projections, the diversion rate increase to 81 percent is moderated by projected increases in waste tire generation. While the projections are subject to many sources of uncertainty, and the continuing economic downturn has so far resulted in reduced waste tire generation, it is apparent that CalRecycle is not likely to achieve its 90 percent diversion goal without significant new funding, subsidies and/or mandates. Note that, if not for the statutory ban on CalRecycle support of TDF, that market segment would have been classified as a medium priority, given its importance role as a sustainable, economic market for waste tires and the significant potential reduction in demand that could result from the proposed federal rule mentioned above.

**Table ES-1. Market Expansion Priorities along with Current and Projected Market Use and Penetration Estimates (Assuming Current Legislation and Funding Levels Remain)**

Expansion Priority Level	Market Segment	2008 Market (Million PTEs)	2008 Penetration (%)		2015 Market Projection <sup>4</sup> (Million PTEs)	2015 Potential Penetration (%)	
			Low	High		Low	High
<b>Top Priority</b> Focus resources on these markets to as great an extent possible to support maximum market expansion.	GR - Rubberized Asphalt Concrete (RAC)	4.32	12	17	6.1	17	24
	GR - Molded and Extruded	1.15	23	29	2.0	39	49
	GR - Loose-fill Playground/Bark/Mulch	1.15	15	26	2	27	44
	CE - Transportation - lightweight fill <sup>1</sup>	0.73	9	10	1.9	24	27
	CE - Transportation - retaining wall <sup>1</sup>	0.00	0	0	1.0	22	33
	CE - Transportation - light rail <sup>1</sup>	0.00	0	0	0.1	50	100
	CE - Landfill use <sup>1, 2</sup>	2.06 <sup>3</sup>	52	69	2.0	51	67
<b>Medium Priority</b> Focus resources on these market segments to ensure continued strong sales and, to the extent possible, continued growth (for the listed ground rubber products) or to nurture market segments with long-term potential (for the civil engineering applications listed).	GR - Turf and Athletic Fields	2.44	49	61	3.9	77	97
	GR - Pour-in-place Playground	0.45	6	9	1.2	18	25
	GR - Other	0.54	25	36	0.09	42	62
	CE - Other Civil Engineering (septic, residential retaining wall, related)	0.00	0	0	0.0	0	0
	Other Uses (incl. Agriculture and cut/stamped products)	0.08	4	8	0.1	5	10
<b>Low Priority</b> Monitor their use and as needed and possible, continue to take actions to allow the uses to continue, while not impeding their use.	Retreading	4.42	85	92	4.5	87	94
	Domestic Used Tires	1.85	77	84	2.0	85	93
	Alternative Daily Cover (ADC)	2.06	5	6	2.1	5	6
<b>No Priority</b> Take no action to promote at this time.	Tire-Derived Fuels (TDF)	7.50	38	50	7.7	38	51
	Exported Waste Tires	2.19	22	31	3.7	37	52
	Exported Used Tires	1.51	79	84	1.6	84	89
<b>Totals</b>		<b>32.4</b>	<b>20</b>	<b>26</b>	<b>42.8</b>	<b>26</b>	<b>34</b>
<b>Effective Diversion Rate</b>		<b>72%</b>			<b>81%</b>		

<sup>1</sup> Estimated market size is derived from Kennec estimates.

<sup>2</sup> Landfill civil engineering market size estimate is for landfill gas and leachate recirculation applications only. An additional potential use, in operational layers, is not listed as a priority because of significant regulatory and supply barriers. Despite these barriers, potential for this use supports listing landfill tire-derived aggregate as a priority market segment.

<sup>3</sup> This 2008 landfill civil engineering use estimate should not be used as a benchmark for evaluating future progress as it was necessarily based on reported usage that could not be validated by CalRecycle, and which in some cases may not be consistent with CalRecycle defined civil engineering applications. CalRecycle intends to define specific landfill civil engineering applications for TDA and establish a confirmed baseline when conducting the 2010 market analysis in early 2011.

<sup>4</sup> 2015 projected market use assumes: current trends continue; CalRecycle implements the recommended program adjustments presented in this section; and no major threats to current diversion levels materialize.



## Recommendations

Based on a systematic review of CalRecycle programs a list of options for program enhancement was generated. The options were developed by considering how current and potential new/adjusted programs grouped into six generic market development mechanisms, as listed in Table ES-2 below, could be applied to specifically target the top priority market expansion opportunities and barriers as identified in the report. We also considered lessons learned and key implementation issues in developing the list of options to consider. We then assimilated the top priority options to develop the recommendations listed in Table ES-2 below.

**Table ES-2. Programmatic Recommendations Assuming Current Funding Levels and Legislative Authority**

<b>Mechanism</b>	<b>Broad Programmatic Recommendations</b> <i>(See text for detailed priority options for consideration under each recommendation)</i>
Planning & Performance Measurement	<ol style="list-style-type: none"> <li>1. Continue to conduct a transparent Five-Year Plan development process with ample opportunity for stakeholder input.</li> <li>2. Formalize the strategic framework used in Five-Year Plans.</li> <li>3. Coordinate evaluation and planning activities across programs.</li> <li>4. Strengthen objective setting and performance measurement activities.*</li> </ol>
Research and Development	<ol style="list-style-type: none"> <li>5. Maintain a prioritized research agenda that includes activities across programs and that identifies dissemination and follow-up needs.</li> <li>6. Enhance the annual tire market studies by adding elements that support the Five-Year Plan.</li> <li>7. Establish a new research activity to compile TDP performance and cost information on an ongoing basis from CalRecycle programs, original research and other sources.*</li> <li>8. Allocate a portion of the market development budget for research on potential new products and technologies that utilize waste tires.</li> </ol>
Funding Assistance	<ol style="list-style-type: none"> <li>9. Continue to refine current consumer grant programs to maximize cost effectiveness and target top-priority expansion and diversification opportunities.</li> <li>10. Shift a portion of funds currently allocated to RAC use grants to support a new TDA funding program.*</li> <li>11. Establish a new Market Development Innovations Grant Program.</li> <li>12. Continue to allocate budget for the Tire Equipment Loan Program, subject to demonstration of the need for any additional proposed production capacity.</li> <li>13. Streamline reporting requirements for funding recipients, but strengthen requirements to participate in surveys and case studies.</li> </ol>
Business & Technical Assistance	<ol style="list-style-type: none"> <li>14. Continue to focus TDA and RAC technical assistance on top-priority opportunities and barriers.</li> <li>15. Continue to offer TBAP direct business assistance services, while adjusting program rules that determine how to prioritize applicants.</li> <li>16. Increase stakeholder buy-in and participation in TBAP sectorwide projects.</li> <li>17. Coordinate technical assistance activities across programs and other market development mechanisms.*</li> </ol>
Education and Training	<ol style="list-style-type: none"> <li>18. Expand education and training activities and continue to focus them on top-priority market expansion opportunities and barriers.</li> <li>19. Maintain a consolidated education and training agenda that is coordinated</li> </ol>

Mechanism	Broad Programmatic Recommendations (See text for detailed priority options for consideration under each recommendation)
	and synchronized with technical assistance, outreach and promotion activities. 20. Provide a central access point that consolidates education and training resources.* 21. Expand partnerships to leverage and institutionalize education and training programs.
Outreach and Promotion	22. Develop a coordinated outreach and promotion plan that integrates activities and performance measurement across programs. 23. Maximize efforts targeting high-impact audiences and market segments. 24. Expand and strengthen CalRecycle outreach and promotion vehicles targeting key customer groups.* 25. Increase partnerships within California and externally to promote TDP sales.

\* Top priority recommendations for new or adjusted current activities in each category are identified with an asterisk.

## Next Steps and Options Moving Forward

This study also examined a range of policies that could complement or even replace current programs. Based on this policy analysis, the broad scenarios summarized in Table ES-3 were developed.

**Table ES-3. Three Alternative Planning Scenarios for Moving Forward**

Scenario	Cost Impacts	Estimated Maximum 2015 Diversion Attainable	Notes/Issues
1. Optimize Programs Under Current Legislation and Funding Levels	No change — CalRecycle allocations of approximately \$18.5 million per year to market development under current funding.	81% Diversion Rate 428,000 tons 42.8 million PTE	Uncertainty over projected diversion but not likely to reach 90% goal Potential for major reduction in diversion due to federal TDF regulations and other threats.
2. Complement Current Programs With New Legislation	Cost impacts to CalRecycle for overseeing new use mandates Possible increased costs to state/local agencies due to purchase preference and/or use mandate.	85%-90% Diversion Rate 449,000-474,000 tons; 44.9- 47.4 million PTE (Estimated 5% Increase over Scenario 1, with higher potential levels through use mandates).	Legislation required – will garner significant opposition Feasibility of use preferences/mandates is questionable at present due to budget and other concerns.

Scenario	Cost Impacts	Estimated Maximum 2015 Diversion Attainable	Notes/Issues
3. Extended Producer Responsibility	Reduction of state programs and costs. Increase in private sector programs. Possible reduction in net cost to generators, dealers, etc.	81% assumed— but could vary significantly (could be required to achieve 100% diversion).	Would privatize market development programs. Specific CalRecycle continuing role to be determined through legislative process. Significant time and legislation required to implement.

The first scenario involves optimizing current programs assuming current legislation and funding levels remain intact, by implementing the recommendations listed in Table ES-2 above. Current total CalRecycle costs would not be changed under this scenario. While there is uncertainty over future waste tire generation and market trends, under this scenario it is estimated that the diversion reach could reach up to 81 percent by 2015 at best, assuming no major threats materialize. Taking steps to optimize the current programs is important both as a means of increasing diversion, but also to guard against potential reductions in waste tire demand due to threats as described in Section 3 of this report.

The second scenario includes new policies that would require legislation to implement. The following two policy adjustments are recommended:

- Securing legislative authority to allow CalRecycle to promote the maintenance and expansion of TDF markets; and
- Seeking regulatory changes to allow promotion of TDA use in residential septic drain field systems.

The following three policy options, while not recommended due largely to feasibility issues, are identified here for consideration by CalRecycle and stakeholders as possible means of further expanding waste tire markets:

- Expanding and strengthening current recycled product purchase price preferences and/or use mandates (especially expanding the current Caltrans RAC use mandate to local agencies under specified conditions);
- Requiring that ground rubber purchased to satisfy Caltrans' RAC use mandate is produced with California-generated tires (this may not be possible due to federal Interstate Commerce Clause considerations, but this would need to be confirmed); and
- Announcing a future tire landfill ban to be phased in over several years, and conditional on a determination that waste tire demand exceeds supply.

The policies above could help to achieve an estimated increase in the 2015 diversion rates to 85 to as much as 90 percent, with some cost impacts to CalRecycle to administer them, and possible additional increased costs to state and local agencies due to the expanded purchase price preference or use mandate programs (a portion of which could potentially be offset by adjusted

CalRecycle funding assistance programs). The estimated increased diversion rates beyond about 83 percent would be contingent upon a strong RAC use mandate at the local level, which may prove politically infeasible, especially at the current time. However, given the potential benefits to waste tire management and to local agencies through use of RAC, it merits additional investigation.

Scenario 3 is based on the adoption of a new extended producer responsibility mandate for waste tires, modeled after the program in place in Ontario, but with a strong market development requirement added. There are many different options for how such legislation could be structured, but the underlying commonality would be a requirement on tire manufacturers to establish and pay for a system to ensure that all waste tires generated in California are managed appropriately. The law could potentially require 100 percent diversion ultimately with interim goals. Implementing EPR for tires could substantially reduce the size and scope of, or even eliminate, CalRecycle's waste tire market development program. Presumably this would be implemented in conjunction with a reduction of the tire retail fee to the point needed to maintain state permitting and enforcement roles.

R.W. Beck has not made a determination about whether EPR for tires should be pursued or not at this time. Rather we recommend that CalRecycle place the concept before stakeholders for public input and discussion. It is a compelling concept with the potential to increase efficiency and radically alter current practices. As such it deserves to a careful and unrushed hearing.

## **Conclusion**

This report provides a systematic framework, quantitative and qualitative information, recommendations and templates for new program review to assist CalRecycle and stakeholders in evaluating options and developing the next Five-Year Tire Plan in late 2010 and early 2011. The report provides a detailed list of options for consideration, as well as consolidated recommendations and budget considerations to assist the agency. However, it is assumed that CalRecycle staff and management will need to further prioritize the options as well as determine implementation feasibility, roles, and responsibilities.

# Section 1

## Introduction

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### ***Purpose of Project***

The California legislature recognized the need for improved waste tire management with the passage of the California Tire Recycling Act in 1989, and in 2000 Senate Bill (SB) 876 was enacted, which expanded funding through a \$1.00 tire fee and charged the California Department of Resources Recycling and Recovery<sup>†</sup> (CalRecycle) with implementing a comprehensive waste tire management system, including expansion of recycling through market development activities. CalRecycle has adopted a strategic directive to increase the statewide waste tire diversion rate to 90 percent by the year 2015. In order to achieve this diversion goal, markets are needed to consume tires diverted from disposal.

The state has been working for nearly 20 years to develop sustainable markets for waste tires and since the early 2000s has updated a Five-Year Plan every two years. With the objective of assisting Staff in refining its market development programs to achieve a ninety percent diversion goal, CalRecycle staff directed R. W. Beck to conduct an evaluation of CalRecycle's waste tire market development programs. This evaluation seeks to determine how well these programs, as currently structured and operated, are succeeding in addressing and achieving the state's recycling market development goals and to identify ways in which California's tire market development approach could be enhanced. To continue the public input practices established by the previous board structure, CalRecycle specifically designed the project to allow multiple opportunities for stakeholder input, through an advisory group, and through four public workshops held during the course of the project.

### ***Project Approach and Activities***

This multi-phase project involved the following steps:

1. ***Creation of an advisory group to provide input throughout the project.*** Advisory group members provided valuable expertise and insight and are listed in the acknowledgements to this report.
2. ***Refinement of the evaluation approach.*** The proposed evaluation protocol was presented to the project advisory group and CalRecycle staff for review and was further refined.
3. ***Clarification of the state's overarching goals and desired outcomes for waste tire recycling market development and guiding principles.*** These goals and principles were prepared through a consensus process with CalRecycle staff and the advisory group as well as with input from industry stakeholders, and are presented in this report in Section 2: Framework for California Waste Tire Market Development.
4. ***Examination of selected waste tire market development programs used in other states/provinces.*** Programs in Florida, Illinois, South Carolina, Utah, Virginia, and British Columbia were examined and summarized, in a separate work paper titled, "Work Paper

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<sup>†</sup> The department, known as CalRecycle, was formerly the California Integrated Waste Management Board. In this report "CalRecycle" is used to refer to the organization, both in relation to current and past activities.

No.2—Review of Selected Tire Market Development Programs Outside of California,” for use as a reference document for this project.

5. ***Development of a detailed historical summary of the California Waste Tire Market Development Program and associated outcomes.*** This summary was also prepared as a separate draft work paper titled, “Work Paper No. 3—Historical Review of the California Tire Market Development Program.”
6. ***Assessment of the potential size of waste tire market segments and the extent to which they have been penetrated with respect to use of California tires.*** The key results of this market assessment are discussed in Section 3 of this report and covered in more detail in “Work Paper No. 1—Market Penetration Report.” A synthesis of options, costs and other considerations related to further market penetration is provided in Section 7.
7. ***Identification of market expansion opportunities, barriers and options for addressing them.*** A preliminary list of barriers and opportunities was developed with input from CalRecycle staff, the project advisory group, and industry stakeholders. The list was further refined and prioritized upon completion of the market penetration report. A discussion of key barriers related to realizing market penetration opportunities is provided in Section 3 of this report: Market Assessment—Key Findings.
8. ***Evaluation of current state program components and options for consideration.*** CalRecycle’s tire recycling market development programs were evaluated with respect to their effectiveness to date in employing key recycling market development mechanisms and their ability to meet the opportunities and marketplace challenges that lay ahead. This information is provided in Section 4 of this evaluation report.
9. ***Evaluation of planning and performance measurement activities and options for consideration.*** The state’s planning and performance evaluation process was reviewed and options for enhancing this process were delineated and presented in Section 5 of this evaluation report.
10. ***Evaluation of current policies and policy options.*** Section 6 evaluates policy alternatives and their potential for enhancing the state’s ability to achieve 90 percent diversion and other established goals.
11. ***Synthesis of program and policy evaluation results.*** To complete the evaluation, key results from previous steps are reviewed and synthesized to generate findings and conclusions regarding the relative emphasis and optimal approach for addressing future market opportunities and overcoming challenges impeding their realization. This is presented in Section 7, Overall Conclusions and Recommendations.
12. ***Stakeholder Engagement.*** Throughout the planning process, numerous opportunities for stakeholder involvement were provided. A description of stakeholder engagement activities and the stakeholder comments received is provided in Appendix C. Appendix I presents a list of key issues raised by stakeholders during a workshop to review this draft report, along with responses from the project team.

Additional background information is provided as follows:

Appendix A            Glossary of Key Terms

Appendix B	Listing of Key Background Reports Prepared under this Project or Referenced in this Report.
Appendix C	Summary of Stakeholder Feedback
Appendix D	Basis for Market Growth Estimates to 2015
Appendix E	Market Development Budget
Appendix F	Program and Activity Templates
Appendix G	Assumptions Used in Analyzing Costs of Optional Policies
Appendix H	Rationale Used for Key Recommendations
Appendix I	Key Stakeholder Issues and Project Team Responses



# Section 2

## Framework for California Waste Tire Market Development

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### ***California's Tire Market Development Program***

Officially known as the Department of Resources Recycling and Recovery, CalRecycle is a new department within the California Natural Resources Agency and administers programs formerly managed by the California Integrated Waste Management Board (CIWMB) and Department of Conservation, Division of Recycling. CalRecycle is mandated to regulate and manage waste tires within the state. Of the \$1.75 state tire fee, \$1.00 (less administrative costs) is allocated to CalRecycle tire management programs, and \$0.75 of the per-tire fee is allocated to the State Air Pollution Control Fund to help fund its work related to waste tire facility enforcement programs. This funding, however, is slated to decline to \$0.75 per tire on January 1, 2015, with all proceeds going to CalRecycle.

CalRecycle's overall waste tire management strategy focuses on the two interrelated objectives of enforcement and market development. Enforcement works to develop and implement a strong and fair regulatory framework that protects the public's health and safety and the environment but does not stifle the flow and processing of tires. Market development works to support and expand the business and government infrastructure that manufactures and/or uses tire-derived products.

Historically, there has been insufficient market demand (both in terms of capacity and pricing) for waste tire markets serving California to "pull" or divert all of the waste tires from disposal. There is a need for both increased demand in high-volume market categories that can absorb large quantities of waste tires, as well as higher-priced markets that can strengthen the overall economics of waste tire recycling. There is also a need for a diversity of products and end-use markets to guard against possible future disruptions in any one market. Therefore, CalRecycle works to promote a diverse range of markets of all types to collectively ensure that diversion goals are satisfied on an ongoing basis.

Presented below is a description of goals and desired outcomes and guiding principles that, together, provide a framework for CalRecycle's market development efforts. Later in Section 7 this framework is used to evaluate progress to date and optional adjustments to current programs and policies.

### ***Goals and Desired Outcomes***

To help guide future state efforts, Table 2-1 lists goals and desired outcomes related to developing a healthy and viable marketplace to attract and absorb diverted waste tires. Achievement of these outcomes is critical to reaching and maintaining the State's over-arching 90 percent waste tire diversion goal. The goals and desired outcomes were derived from the state's Fifth Edition Five-Year Plan for the Waste Tire Recycling Management Program; discussions with former CIWMB Board Members, CalRecycle staff, and industry stakeholders; and R. W. Beck's experience in state recycling market development work. These goals and outcomes provide a vision for the ideal market conditions that CalRecycle's market development efforts should be aimed at achieving in order to maximize and sustain high diversion rates.



**Table 2-1. Goals and Desired Outcomes for California's Waste Tire Marketplace**

Goals	Desired Outcomes
<p><b>1. Develop Diversified Market Demand</b> Promote the Development of Long-Term, Sustainable Diversified Markets for California Tire-Derived Products (TDPs)</p>	<ul style="list-style-type: none"> <li>• Well-managed, efficient TDP producers making a diversity of tire derived products with strong demand by product consumers.</li> <li>• Standards and specifications for TDPs well established and accepted.</li> <li>• Myths and misconceptions are eliminated and replaced with factual information on the pros, cons, and uses for both high volume and high value tire derived products.</li> <li>• Demand high enough to achieve diversion goals, while remaining balanced with supply with acceptable, consistently satisfied quality and price terms.</li> <li>• Sustainable without ongoing government programs.</li> <li>• Price signals provide an incentive for recycling to generators, haulers, processors and end-users.</li> <li>• Costs, revenues and general market conditions allow firms to operate profitably.</li> </ul>
<p><b>2. Develop High Quality Supply to Meet Market Demand</b> Promote the Development of a Long-Term, Sustainable Supply Infrastructure in California that Efficiently and Profitably Produces High-Quality Raw Materials to Meet Market Demand</p>	<ul style="list-style-type: none"> <li>• Sufficient, well-managed, efficient processors located where needed and able to produce consistent quality and quantity feedstock at acceptable cost.</li> <li>• Adequate haulers able to efficiently move supply into the marketplace.</li> <li>• Standards and specifications established where needed and widely accepted.</li> <li>• Sustainable without ongoing government programs.</li> </ul>
<p><b>3. Grow and Balance Supply and Demand</b> Foster Information Flow, Knowledge Transfer, and Technology and Product Development to continue to increase tire derived product demand and the supply that feeds it.</p>	<ul style="list-style-type: none"> <li>• An effective market intelligence system provides all market players with equal access to information on price and demand trends, standards, policy and regulatory developments and other needed information.</li> <li>• All tire marketplace participants have the knowledge and skills needed to be effective in their respective roles, and are aware of the uses for and benefits of tire derived products.</li> <li>• Processing and product production technologies are commercially proven, available and cost-effective.</li> <li>• Technology development keeps pace with changing needs of the supply/end use marketplace.</li> </ul>

## ***Guiding Principles for Waste Tire Recycling Market Development***

To help define the role of CalRecycle and state government generally in developing California waste tire markets, R. W. Beck worked with CalRecycle management and staff to develop the following guiding principles. CalRecycle seeks to implement its programs and activities in accordance with these guiding principles:

- A. CalRecycle's waste tire market development program is a part of a broader, statewide tires management strategy aimed at protecting public health and safety, conserving resources and protecting the environment, and developing markets to divert waste tires from landfills. Market development efforts should complement but not compromise these broader goals.
- B. CalRecycle's role is to maximize the diversion of waste tires from landfills by building new market opportunities, enhancing existing markets and removing barriers that retard private-sector market expansion and cause market instability. CalRecycle's role in this regard also includes:
  - 1. Proactively motivating and supporting private and public stakeholders by investing in or promoting market development priorities;
  - 2. Building internal and external institutional capacity that enables markets to adapt and thrive over time;
  - 3. Operating at an appropriate scale needed to have the desired impact;
  - 4. Targeting changes that would not have occurred without state programs;
  - 5. Diverting additional tonnage from disposal, as opposed to moving materials from one market to another; and
  - 6. Measuring outcomes and effectiveness to the extent possible, and adjusting programs accordingly
- C. CalRecycle will strive to achieve its recycling market development goals in the least intrusive way possible and in a fair and equitable fashion, thereby cost-effectively utilizing program resources and providing assistance only to the extent needed to meet those goals. CalRecycle's regulatory and enforcement activities will strive to achieve public health and safety objectives in a fair, equitable way and will not unduly constrain the marketplace.

In Section 7, the goals and principles identified in this section are applied as criteria to help identify preferred options for future program and policy adjustments. In the next section, trends associated with California's waste tire marketplace along with associated opportunities for increasing market penetration and key barriers impeding realization of these opportunities are presented and discussed.

## Section 3

# Market Assessment – Key Findings

The following sections summarize key market trends, potential market size and current penetration barriers, and scenarios for achieving a 90 percent diversion rate. This information is adapted from the market penetration background report prepared as part of this project, which provides additional details and market data.

### California Waste Tire Market Trends

Since 1990 CalRecycle has worked to expand markets for waste tires and promote diversion from landfills. Figure 3-1 shows that the number of tires diverted has increased steadily over the years. In the 1990s the growth in diversion resulted in a rapidly increasing diversion rate. However, beginning in the late 1990s, annual increases in the quantity of tires diverted only matched the increases in tire generation, resulting in a plateau for the diversion rate of a little more than 70 percent.

**Figure 3-1. Waste Tire Diversion and Diversion Rate Trends**

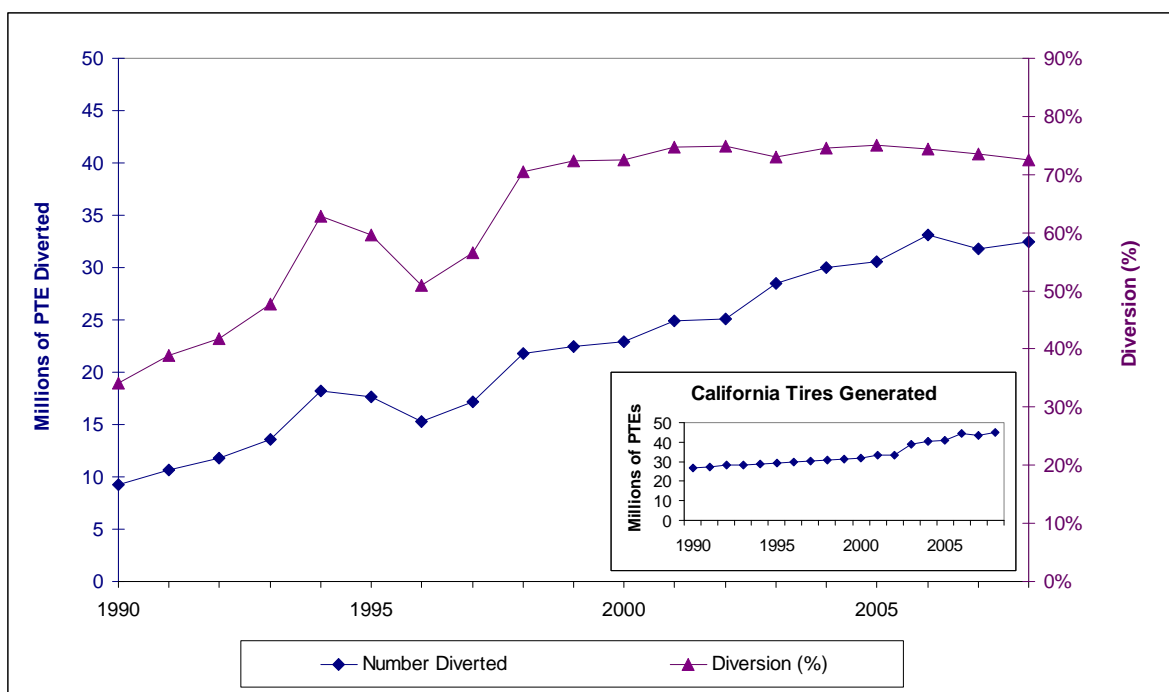


Figure 3-1 shows a top-level overview of diversion. What it does not show is that ongoing efforts by CalRecycle to expand and diversify the waste tire marketplace in the 2000s have resulted in what is now one of the most balanced portfolios of tire markets of any U.S. state. In the mid-1990s a large portion of tires diverted either went to fuel uses or were used as landfill alternative daily cover. By 2008 the share of tires that went to those two markets had fallen to approximately 30 percent of all tires diverted, as increasing quantities of tires went into other applications such as rubberized asphalt concrete (RAC), tire-derived products made from ground rubber, and tire-derived aggregate (TDA) used in civil engineering applications.

The recent recession illustrates the importance of California's diverse markets. Although 2009 recycling and diversion data were not available for this report, preliminary conversations with operators of cement kilns, which are the primary consumer of waste tires for fuel use, indicated that production of cement had fallen by approximately 40 percent or more due to the economic recession that began in fall 2008 and lasted into 2010. As a result, demand for tires from cement kilns was reduced. Because California's marketplace for tires is more diversified than that of the United States in general, California was better able to weather the downturn in this one market compared to the rest of the country.

Table 3-1 shows how California's current marketplace for used and waste tires was structured in 2008. It also includes a summary of market growth projected by R. W. Beck through 2015.

**Table 3-1. Markets and Market Trends for Used and Waste California Tires**

Category	Sub-Category	2008		Projected Future Growth Rates (Annual Number of PTEs) <sup>1</sup>
		Million PTEs	Percent of Total	
<b>Export</b>	Waste Tires	2.19	4.9%	Growing at approximately 6% per year
	Used Tires (Exported)	1.51	3.4%	Stable
	<b>Subtotal</b>	<b>3.69</b>	<b>8.2%</b>	Growing at approximately 4% per year
<b>Reuse</b>	Retread	4.42	9.9%	Stable
	Used Tires (Domestic)	1.85	4.1%	Stable
	<b>Subtotal</b>	<b>6.27</b>	<b>14.0%</b>	Stable
<b>Ground Rubber</b>	RAC & Other Paving	4.32	9.7%	Growing at approximately 9%
	Turf & Athletic Fields	2.44	5.5%	Growing at up to 10% per year
	Loose-Fill Playground/ Bark/Mulch	1.15	2.5%	Loose-fill Stable to modest growth; Bark/Mulch growing at 5% per year
	Pour-in-Place Playground	0.45	1.0%	Growth up to 10% per year
	Molded & Extruded	1.15	2.6%	Growing at approximately 8% per year
	Other	0.54	1.2%	Growing at approximately 8% per year
	<b>Subtotal</b>	<b>10.05</b>	<b>22.4%</b>	Growing at approximately 8% per year
<b>Civil Engineering</b>	Landfill Applications	2.06 <sup>3</sup>	4.6%	Growing at approximately 1% per year
	Non-Landfill Applications	0.73	1.6%	Growth of over 20% per year <sup>2</sup>
	<b>Subtotal</b>	<b>2.79</b>	<b>6.2%</b>	Growth of over 10% per year <sup>2</sup>
<b>Alternative Daily Cover (ADC)</b>		<b>2.06</b>	<b>4.6%</b>	Stable to declining
<b>Other Recycling</b>		<b>0.08</b>	<b>0.2%</b>	Stable to modest growth

Category	Sub-Category	2008		Projected Future Growth Rates (Annual Number of PTEs) <sup>1</sup>
		Million PTEs	Percent of Total	
<b>Tire-Derived Fuel (TDF)</b>	Cement	6.67	14.9%	Stable
	Co-Generation	0.83	1.9%	Declining
	<b>Subtotal</b>	<b>7.50</b>	<b>16.7%</b>	Stable to declining
<b>Landfill Disposal</b>		<b>12.35</b>	<b>27.6%</b>	Slightly declining
<b>Total Generated</b>		<b>44.79</b>	<b>100.0%</b>	Growing at approximately 2% per year
<b>Total Diverted from Landfill</b>		<b>32.44</b>	<b>72.4%</b>	

<sup>1</sup> The projected future growth rates shown are based on a regression analysis of California tire market data from 2003 to 2008. For many categories, growth rates predicted by the regression analysis were adjusted by R. W. Beck to account more heavily for near-term changes in the marketplace, and in anticipation that recent CalRecycle programs will prove effective in increasing diversion to certain categories.

<sup>2</sup> Growth is not consistent from year-to-year due to sporadic use based on individual large project needs. CalRecycle continues to focus on growing this market segment and while there is great potential for significantly more use, concerted effort by CalRecycle to grow this market is required to achieve the projected growth rate shown.

<sup>3</sup> This 2008 landfill civil engineering use estimate should not be used as a benchmark for evaluating future progress as it was necessarily based on reported usage that could not be validated by CalRecycle, and which in some cases may not be consistent with CalRecycle defined civil engineering applications.

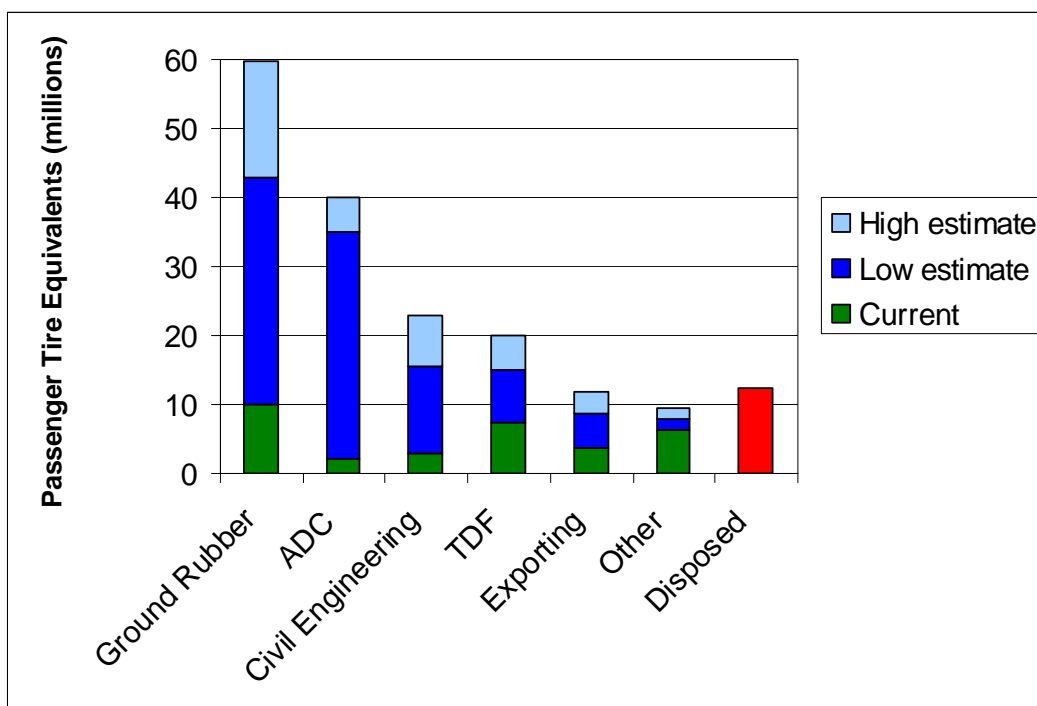
As described in Appendix D and in Working Paper #1, Market Penetration Report, the future growth rates forecasted in Table 3-1 are based in part on a regression analysis of tire market data from 2003 to 2008 to produce predictive formulae for future market place changes. For many subcategories, R. W. Beck made adjustments to the formulae to account more heavily for near-term changes in the marketplace, or to account for anticipated results from current CalRecycle programs that would not have been fully reflected in past data. A listing of the growth rates forecasted by the regression analysis and specific R. W. Beck adjustments to the growth factors can be found in Appendix D. These growth rates form the basis of future diversion estimates produced by R. W. Beck out to the year 2015.

It should be noted that the projections are subject to high levels of uncertainty, and are presented here as a best available estimate for planning purposes. While the specific growth projections are subject to much uncertainty, it is highly probable that waste tire generation will grow steadily in future years, especially after the previous two years of contraction. The projections allow CalRecycle to anticipate the need to account for this growth in planning, and also indicate the direction of future trends.

## ***Potential Market Size and Current Penetration***

Figure 3-2 provides a graphical depiction of high and low estimates for theoretical annual market size and penetration as of 2008.

**Figure 3-2. 2008 Market Penetration and Estimates of Annual Market Potential**



Source: R. W. Beck, "Tire Market Penetration Report," May 2010.

The green bars of Figure 3-2 represent the quantity of tires (PTEs) that went into each category in 2008. The dark blue portion of each bar represents an estimate of the additional quantity of tires that could be accommodated in a low estimate for that category, assuming that all barriers to further penetration are removed. The light blue portion of the bars represents a higher level annual estimate for each category. The red bar is the quantity of tires that was disposed that could be diverted into one or more of the blue shaded market areas shown.

The theoretical market size data that is depicted graphically in Figure 3-2 are presented in more detail below in Table 3-2. These estimates were principally made by R. W. Beck based upon trends and estimates of market indicators, as described in detail in *Working Paper #1: Market Penetration Report*. Because of uncertainty in the potential market size, both low and high end estimates are presented.<sup>‡</sup> The next column shows actual 2008 tire quantities that went into each market application as reported in "California Scrap Tire Market Report: 2008," May 2009. The 2008 market penetration percentages were calculated by dividing the quantities that went into each market by the high and low estimates for the theoretical market size. The 2015 potential market size figures were calculated by multiplying the 2008 market category size figures by the market category growth estimates listed in Table 3-1 for each year from 2009 to 2015. The table ends with 2015 potential market penetration rates, which were calculated by dividing potential 2015 market size estimates by the high and low theoretical market size estimates from the first column.

<sup>‡</sup> The bases of the estimates found in Figure 3-2 and Table 3-2 are discussed in R. W. Beck's Working Paper #1: "Tire Market Penetration Report," May 2010.

**Table 3-2. Estimated Market Size, 2008 Penetration, and Potential Penetration by 2015**

Category	Estimated Theoretical Market Size (Million PTEs)		2008 Marketed (Million PTEs)	2008 Penetration (%)		2015 Market Potential (Million PTEs)	2015 Potential Penetration (%)	
	Low	High		Low	High		Low	High
<b>Ground Rubber</b>	<b>44.0</b>	<b>61.7</b>	<b>10.05</b>	<b>16</b>	<b>23</b>	<b>16.1</b>	<b>26</b>	<b>38</b>
<i>Rubberized Asphalt Concrete (RAC)</i>	25	35	4.32	12	17	6.1	17	24
<i>Turf and Athletic Fields</i>	4.0	5.0	2.44	49	61	3.9	77	97
<i>Loose-fill Playground/Bark/Mulch</i>	4.5	7.5	1.15	15	26	2	27	44
<i>Pour-in-place Playground</i>	5.0	7.0	0.45	6	9	1.2	18	25
<i>Molded and Extruded</i>	4.0	5.0	1.15	23	29	2.0	39	49
<i>Other Ground Rubber</i>	1.5	2.2	0.54	25	36	0.9	42	62
<b>Alternative Daily Cover (ADC)</b>	<b>35</b>	<b>40</b>	<b>2.06</b>	<b>5</b>	<b>6</b>	<b>2.1</b>	<b>5</b>	<b>6</b>
<b>Civil Engineering</b>	<b>17.1</b>	<b>24.7</b>	<b>2.79</b>	<b>11</b>	<b>16</b>	<b>5.0</b>	<b>20</b>	<b>29</b>
<i>Transportation - lightweight fill<sup>1</sup></i>	7.0	8.0	0.73	9	10	1.	24	27
<i>Transportation - retaining wall<sup>1</sup></i>	3.0	4.5	0.00	0	0	1.0	22	33
<i>Transportation – light rail</i>	0.1	0.2	0.00	0	0	0.1	50	100
<i>Landfill use<sup>1, 2</sup></i>	3.0	4.0	2.06	52	69	2.0	51	67
<i>Other uses – e.g., septic<sup>3</sup>, residential retaining wall</i>	4.0	8.0	0.00	0	0	0.0	0	0
<b>Tire Derived Fuels (TDF)</b>	<b>15</b>	<b>20</b>	<b>7.50</b>	<b>38</b>	<b>50</b>	<b>7.7</b>	<b>38</b>	<b>51</b>
<b>Exported Waste Tires</b>	<b>7</b>	<b>10</b>	<b>2.19</b>	<b>22</b>	<b>31</b>	<b>3.7</b>	<b>37</b>	<b>52</b>
<b>Exported Used Tires</b>	<b>1.8</b>	<b>1.9</b>	<b>1.51</b>	<b>79</b>	<b>84</b>	<b>1.6</b>	<b>84</b>	<b>89</b>
<b>Retreading</b>	<b>4.8</b>	<b>5.2</b>	<b>4.42</b>	<b>85</b>	<b>92</b>	<b>4.5</b>	<b>87</b>	<b>94</b>
<b>Domestic Used Tires</b>	<b>2.2</b>	<b>2.4</b>	<b>1.85</b>	<b>77</b>	<b>84</b>	<b>2.0</b>	<b>85</b>	<b>93</b>
<b>Other Uses (Incl. Agriculture)</b>	<b>1</b>	<b>2</b>	<b>0.08</b>	<b>4</b>	<b>8</b>	<b>0.1</b>	<b>5</b>	<b>10</b>
<b>Total</b>	<b>128</b>	<b>168</b>	<b>32.4</b>	<b>19</b>	<b>25</b>	<b>42.8</b>	<b>26</b>	<b>34</b>

<sup>1</sup> Estimated market size derived from Kennec estimates.

<sup>2</sup> Landfill uses market size estimate is for landfill gas and leachate recirculation applications only. The 2008 estimate should not be used as a benchmark to evaluate future effort as it was necessarily based on reported use that in some cases could not be validated by CalRecycle and may not comprise CalRecycle defined civil engineering uses. Regardless of the uncertainty, R. W. Beck, Kennec, and CalRecycle agree that market penetration for landfill use is relatively low and that there is potential for more TDA to go to landfill gas applications. Landfill applications also include use of significant potential quantities of TDA in operational layers; however, this use is not listed separately because of significant regulatory and supply barriers. Despite the barriers, CalRecycle should be open to opportunities to expand such uses and this potential contributes to listing landfill TDA as a priority market segment.

<sup>3</sup> This application is listed because it has achieved wide acceptance in some other states; however, it is not currently included in the State Water Resources Control Board regulations.



Table 3-1 shows that more than 12 million California waste tires were landfilled in 2008. A 90 percent diversion rate in 2008 would have required that approximately 8 of those 12 million tires go into the markets shown in Table 3-2. Due to population growth, market consumption of tires will need to grow by 5.9 million tires by 2015 just to keep the diversion rate equal to what it was in 2008. Furthermore, market demand and diversion for an additional 9.3 million tires (for an overall increase of 15.2 million tires by 2015 compared to 2008) would be required to achieve a 90 percent diversion rate by 2015. Figure 3-2 and Table 3-2 show that several general upper-level market categories on their own could accommodate the additional 16.6 million PTEs diversion from landfill that would be required, including ground rubber (collectively of all subcategories), ADC, and potentially civil engineering under high theoretical market size estimates. Alternatively, the additional tires that need to be diverted to achieve 90 percent can be distributed among several or all of the categories and subcategories. Even certain categories that have a relatively high market penetration, such as the turf and athletic field category, can continue to expand and take significantly more tires to help the state achieve its landfill diversion goal.

CalRecycle's existing market development program is focused on increasing ground rubber use (RAC and other TDPs) and civil engineering projects that use TDA, and the 2009 Five-Year Plan is structured and funded to move California toward 90 percent diversion through those specific market segments. Based on the 2008 market category size and market category growth trend estimates listed in Table 3-1, and assuming CalRecycle's current programs and funding as laid out in the Five-Year Plan result in additional diversion, R. W. Beck forecasts that market consumption may increase by an additional 10.2 million PTEs compared to 2008 levels, to a total diversion of 42.8 million PTEs by 2015. At this diversion level, and assuming tire generation grows to 52.9 million PTEs by 2015, California is presently on track to achieve an 81 percent diversion rate for waste tires by 2015. This analysis assumes that the upward trend in many markets continues. The current economic downturn has resulted in at least short-term disruptions of these trends for some categories and it is possible that certain threats could further impact future market growth. While an 81 percent diversion rate would be an improvement over the 72 percent diversion rate of 2008, it still falls short of the state's 90 percent diversion rate goal. In presenting the forecasts of this section, there is risk that past trends and/or our adjustments to trend data may not accurately predict growth over the next few years. There is also risk that current market softening may result in long-term changes to the marketplace, which cannot be readily predicted.

Based on research results presented herein, CalRecycle will need to apply more resources to its market development program, building on existing strategies and including new ones as well, or consider other measures, in order to reach its diversion goal. For each market segment there are market expansion barriers and threats that stand in the way of CalRecycle achieving its goal. These barriers and threats are discussed below.

## ***Market Barriers and Threats***

The apparent opportunities shown in Table 3-2 indicating where market penetration is a low percentage often have very real obstacles to achieving higher penetration levels. Key barriers to market expansion are presented in Table 3-3. Table 3-3 lists market segments generally in order of the largest theoretical market expansion potential, along with the key barriers related to each segment. At the bottom of the table, barriers related to multiple segments are listed. Table 3-3 lists the key barriers to market expansion opportunities in a relatively broad manner. These key barriers and some additional barriers or nuances, are described in more detail in Section 4, along with options to address them.



It should be noted that a major category of barriers to TDA use, and to a lesser extent RAC and other TDP use, in remote regions is transportation distance and the associated cost. This appears in a few different financial or economic barriers below. There is a need for more processing capacity in remote regions such as the far northwestern or northeastern part of the state; however, the very low generation of tires in such regions makes siting new facilities highly unlikely. Solutions to this part of the supply challenge are more likely to involve supply depots, mobile shredding systems and/or financial support for shipping costs, than the siting of new, full scale processors in remote regions.

**Table 3-3. Key Barriers to Additional Market Penetration**

Market Category/Sub-Categories	Barriers
<b>Ground Rubber</b>	
<ul style="list-style-type: none"> <li>• RAC and Other Paving</li> </ul>	<b>Financial</b> —Specialized heating and blending equipment is needed by batch plants and chip seal contractors to use RAC, limiting use to larger project sizes and contractors with the required equipment.
<ul style="list-style-type: none"> <li>• RAC and Other Paving</li> <li>• Turf and Athletic Fields</li> <li>• Molded and Extruded</li> </ul>	<b>Financial</b> —Some crumb rubber from outside of California is subsidized, reducing its cost compared to California tire crumb, placing California processors at a disadvantage.
<ul style="list-style-type: none"> <li>• RAC and Other Paving</li> <li>• Turf and Athletic Fields</li> <li>• Loose-Fill Playground</li> <li>• Pour-in-Place Playground</li> <li>• Mulch/Bark</li> <li>• Molded and Extruded</li> <li>• Other</li> </ul>	<b>Technical</b> —Lack of consistency in composition of tires/feedstock requires consistent quality control/quality assurance by suppliers.
<ul style="list-style-type: none"> <li>• Turf and Athletic Fields</li> <li>• Loose-Fill Playground</li> <li>• Pour-in-Place Playground</li> <li>• Mulch/Bark</li> <li>• Molded and Extruded</li> <li>• Other</li> </ul>	<b>Technical</b> —Lack of industry standards and specifications, testing protocols, and accessibility of testing equipment complicates quality control/quality assurance efforts.
<ul style="list-style-type: none"> <li>• Turf and Athletic Fields</li> <li>• Loose-Fill Playground</li> <li>• Pour-in-Place Playground</li> <li>• Mulch/Bark</li> </ul>	<b>Financial/Research</b> —High up-front costs are more than for alternative non-tire products; long-term product performance and life-cycle costs have not been documented by independent agencies.
<ul style="list-style-type: none"> <li>• Molded and Extruded</li> <li>• Other</li> </ul>	<b>Technical</b> —Inherent limitations of the material limit its usability as a feedstock.
<ul style="list-style-type: none"> <li>• Molded and Extruded</li> <li>• Other</li> </ul>	<b>Financial</b> —Inconsistent financial benefit to feedstock conversion, as benefits depend upon price fluctuations of other materials, e.g., oil, etc.; processors have not invested in production capacity for ultra fine rubber due to unproven demand.

Market Category/Sub-Categories	Barriers
<b>Alternative Daily Cover</b>	
	<b>Financial/Policy</b> —Other ADC materials are readily available but tire ADC needs to be trucked in at a cost, unless a processor happens to be collocated at a landfill, and used in greater amounts than alternatives; requires prior CalRecycle and local Enforcement Agency approval and modification of landfill operating permit.
<b>Civil Engineering</b>	
<ul style="list-style-type: none"> <li>Transportation-Related Applications</li> </ul>	<b>Financial/Policy</b> —At this point in time individual project sizes are relatively large and irregular in timing, and as a result are disruptive to their routine business operations, so that processors are hesitant to enter marketplace as a supplier or invest in equipment to produce Type A and B TDA. Regulatory issues related to storage of tires for large jobs are also a barrier. Cost of transporting TDA long distances also reduces its competitiveness with conventional aggregate, especially when local supplies are adequate.
<ul style="list-style-type: none"> <li>Other Applications</li> </ul>	<b>Policy</b> —Currently the State Water Resources Control Board does not include in their regulations the use of TDA in septic system applications, which use is approved in a large number of other states.
<b>Other Recycling</b>	
<ul style="list-style-type: none"> <li>Emerging Fuel/Energy Technologies</li> </ul>	<b>Research/Technical</b> —Technologies such as devulcanization, pyrolysis, gasification and others remain commercially unproven.
	<b>Policy</b> —Unresolved regulatory issues related to permitting of emerging fuel/energy technologies.
	<b>Outreach/Financial</b> —Lack of information about emerging fuel/energy technologies makes them difficult to implement/fund.
<b>Export</b>	
	<b>Educational</b> —Lack of information/knowledge regarding export regulations and how to export, especially when broker not used.
<b>Cross Category</b>	
<ul style="list-style-type: none"> <li>All</li> </ul>	<b>Financial</b> —Tire processor and TDP product manufacturing businesses are at an economic disadvantage when competing against older, larger, and more established incumbent products and materials and low margins leave little funds for improving business capitalization or extensive marketing campaigns.
<ul style="list-style-type: none"> <li>RAC</li> <li>Civil Engineering</li> </ul>	<b>Financial</b> —There are a relatively small number of tire processors and they are concentrated in population centers where tires are generated. However, many project locations are in remote unpopulated areas where freight costs are a disincentive to using materials from tires. This is especially the case for TDA and RAC.
<ul style="list-style-type: none"> <li>All</li> </ul>	<b>Informational/Research/Outreach/Technical</b> —Some potential consumers of tire-derived products have concerns regarding the health, safety, and environmental impacts of tire-derived products and feedstocks. There is a lack of information/awareness regarding best management practices to mitigate potential impacts.

Market Category/Sub-Categories	Barriers
<ul style="list-style-type: none"> <li>• RAC and Other Paving</li> <li>• Landfill Applications</li> <li>• Transportation-Related Applications</li> </ul>	<b>Educational/Technical</b> —Local government specifiers and engineers with are not familiar with advantages of products and how to design/specify projects.
<ul style="list-style-type: none"> <li>• All</li> </ul>	<b>Financial/Technical/Educational</b> —Some businesses lack expertise regarding how to market their products, streamline operations, and otherwise improve and expand their business.

The above table lists barriers to expanding demand over and above current levels in key market segments. It is important to recognize that markets are fluid and there are threats that could potentially reduce current demand in some segments over time. Some key threats that could potentially impact diversion levels over the next three years or more are listed below:

- U.S. EPA has proposed a new regulation that could potentially have the effect of reducing the use of TDF in cement kilns by as much as 5.4 million PTE (or 12 percent of total generation). The rule would define whole tires and processed tires larger than 2 inches consumed as fuel as municipal solid waste, thereby requiring cement kilns to secure new permits and abide by operating procedures. Industry experts caution that these plans would likely switch to other fuels rather than comply with these requirements and costs. Using 2-inch TDF chips would result in a new cost compared with the current tip fee revenues derived from acceptance of whole tires;
- In addition to the regulatory threat to TDF, contraction of the California cement industry due to the current economic downturn, which is assumed to be temporary, combined with a shift by cogeneration facilities to renewable power sources triggered by AB 32 and other state policies, could further reduce demand for TDF;
- New standards under development in relation to the Americans with Disabilities Act could effectively reduce or eliminate the commercial loose-fill playground market.
- The current economic downturn, which has resulted in hopefully a short-term reduced demand for several tire-derived products, and perhaps most notably for TDF in cement kilns, could be prolonged or even intensify, resulting in the potential long-term loss of demand and/or processor closures, putting added pressure on the need for market development;
- The recent significant increase in ground rubber production capacity combined with the possibility of significantly reduced demand could potentially result in a glut of ground rubber, with price reductions, reduced profitability and possibly plant closures. Should this situation arise, low-cost ground rubber from subsidized producers in other states and in Canada could potentially out-compete California-produced ground rubber in some markets;
- Perceived health concerns and sustained media coverage could reduce demand for certain ground rubber products and/or spur installers and distributors to pursue alternatives to tire rubber, especially turf products and potentially bark/mulch and loose-fill playground surfacing products;
- While not currently under discussion, California is currently experiencing a severe budget crunch and if it was to occur, a significant reduction in tire program funding could reduce grants, other financial assistance, technical assistance and promotional efforts, potentially triggering a reduction in demand and/or production capacity;

- Strong demand for waste tires by Asian nations, especially China, could grow and then stall as waste tire collection volumes grow in China and other Asian nations, potentially causing a sudden glut of waste tires in California; and
- Some developing countries are considering legislation that could impose bans or duties on the importation of used tires and/or waste tires.

## ***Prioritization of Market Expansion Opportunities***

This subsection provides a summary of where R. W. Beck believes market expansion opportunities exist, organized into top, medium, low, and no priority groupings. These priority assignments are based on the market growth trends, market penetration estimates, and barriers discussions of this section and developed in more detail in other supporting documents listed in Appendix B, as well as CalRecycle's legislative authority. These priorities coincide with current CalRecycle program objectives.

It must be emphasized that these priorities are not intended to express any type of value judgment regarding which market segments are more desirable than others. Given CalRecycle's goals to build a diverse market place and to expand demand to allow achievement of the 90 percent diversion goal, the priorities are solely intended to indicate which market segments, at this particular moment in time, should be focused on in order to move toward that goal.

### **Top-Priority Market Expansion Opportunities**

Growth in these market segments is critical to achieving 90 percent diversion, and expansion is in synch with CalRecycle goals and market development principles. CalRecycle should focus resources on these markets to as great an extent possible to support maximum market expansion, while providing appropriate level of resources to maintain and allow for growth in market segments identified as a lower priority.

- **Ground Rubber:**
  - **RAC**—RAC still offers significant growth opportunities, especially for local agency use and with potential for expanded use by Caltrans in new areas (e.g., terminal blend). There are also opportunities to increase the percentage of material used that is California generated versus imported from other states and provinces, which is extensive.
  - **Loose-Fill Playground Surfacing/Bark/Mulch**—Loose fill is well established and a large user of ground rubber, although it is threatened by a potential change in performance test methods related to the Americans with Disabilities Act. Bark/mulch is one of the few TDPs to achieve sales in retail stores, there is still potential growth for bark both at retail and at commercial and government properties. Production of bark/mulch on the West Coast is lagging the East Coast where the market is much larger, implying significant growth potential.
  - **Molded and extruded products**—This category includes a range of flooring and outdoor surfacing products with high growth potential, including as consumer products. While challenging and probably a long-term effort, feedstock conversion—targeting established manufacturers of established products—holds the promise of significant growth within established industries and product lines. Additionally, rubber-plastic compounds and other innovative ground rubber applications may hold promise to expand use of ground rubber in many new or reformulated consumer and industrial products.

- **Civil Engineering:**
  - **Landfill applications**—This proven application has only been tried by ten of the state's landfills for landfill gas collection and leachate recirculation systems and the smaller but recurring projects are easier for processors to supply compared to transportation civil engineering projects. There are higher-volume uses related to leachate collection and operations layers that also have high potential, but they have significant supply, cost and possibly regulatory barriers that inhibit their potential.
  - **Transportation retaining wall, lightweight fill and light rail**—The first two applications are proven uses for which Caltrans has adopted supporting policies for use either currently (lightweight fill) or anticipated in the near future (retaining wall). There is a large potential to expand use in both state and local agency sponsored projects. Important supply and other barriers must be addressed. Light rail projects are included as a priority, even though the potential is relatively low, because of the benefits provided and potential for further exposure to TDA in civil engineering applications.

### Medium Priority Market Expansion Opportunities

These market segments already use large quantities of California tires, and sustained use is critical to achieving and maintaining the 90% diversion goal. CalRecycle should focus resources on these market segments to ensure continued strong sales and also, to the extent possible, continued growth. CalRecycle should be wary of threats that may reduce volumes flowing to these. Also included are civil engineering market segments that have high potential growth in the long term, but low potential in the short term.

- **Ground Rubber:**
  - **Pour-in-Place Playground Surfacing**—Pour-in-place playgrounds are currently primarily made from buffings from truck tire retreading/reuse applications, which is not a waste tire diversion application. There is room for expansion of pour-in-place playgrounds made from waste truck tire buffings and/or from developing product designs where ground tire material is incorporated into the structure. There is some concern that playground surfacing may be slowing due to market penetration and/or perceived environment or (for loose fill) health concerns. However, sustained use with the possibility of significant growth is likely for some time.
  - **Athletic fields**—Athletic field installations continue to grow mostly on its own merits. CalRecycle can best support this market with independent cost-benefit assessments and by addressing environment and health concerns with fact based research, as is being done through a study now under way. While there is plenty of short-term potential left in this market, it will begin to moderate over the long term due to market saturation. Some California stakeholders suggest the market is already beginning to decline as substitutes for rubber infill are growing.
- **Civil Engineering:**
  - **Other uses (residential septic and residential retaining walls)**—These uses have significant potential, but will require a long period of time to demonstrate, overcome policy and institutional barriers, and develop supply chains for local distribution. Additionally, use of TDA in water quality management applications such as storm water runoff systems and oil/sand separation applications holds as yet unquantified promise.

## Low Priority Market Expansion Opportunities

These market segments are either not viewed as a highly desirable end use, or are already near their maximum market potential. CalRecycle should monitor their use and as needed and possible, continue to take actions to allow the uses to continue, while not impeding their use.

- **Reuse (used tires and retreading)**—These are highly mature and stable, economic uses that are likely to continue to be a staple of California tire markets. They have reached their near maximum potential already.
- **ADC**—While this use is not perceived as a high priority, it does have the potential to use additional quantities of tires. Also, it may have a role in helping to address the civil engineering supply barrier by providing a market use from which flows may be able to be diverted to civil engineering projects as those projects arise.

## No Priority

These are market segments that CalRecycle should take no action to promote at this time.

- **TDF**—TDF is a very important, sustainable and economic market to support diversion, which has the potential to use additional tires (especially as the economy rebounds), and which is subject to threats in the near term that could reduce its use from policy action on the national and state levels. Ideally, if not for the current legislatively mandated moratorium on promotion by CalRecycle, R. W. Beck would recommend this as a high priority market segment.
- **Export**—While export market demand is currently growing and diverts significant quantities of tires from California landfills, there is very little information about how tires are used in export markets. There is also a risk over the long term that export markets may suddenly collapse, leaving the state without sufficient diversion options to handle the resulting increase in flows. Moreover, because of sometimes highly favorable economics, exporters have disrupted markets to a degree by offering lower than normal tip fees, and some have cited a risk that exports could jeopardize in-state diversion flows by closing off access to tires by in state markets. CalRecycle is currently reviewing compliance and enforcement issues associated with flow of waste tires to export markets.

## Market Analysis Addendum

The market estimates and projections discussed in this Section and throughout this report are subject to much uncertainty. The analysis was conducted in late 2009, while the project and this report were finalized in September 2010. Following are several key trends that have affected markets, as documented in CalRecycle's "Tire Market Analysis Report: 2009," also released in September 2010:

**Waste Tire Generation**—Waste tire generation in 2009 was estimated at 41.3 million PTE, nearly 8 percent lower than in 2008, and anecdotally, this trend may have intensified in 2010. However, the Rubber Manufacturers Association reports that tire sales are rebounding, indicating that waste tire generation may again begin to increase. However, it remains to be seen whether the 2015 base projection used in this report of 52.9 million PTE will hold true. It appears at this time that this projection may be high.

**Diversification**—Tire diversion in 2009 was estimated to be 30.0 million PTE. While this is more than seven percent lower than in 2008, the fact that waste tire generation was also down resulted in the diversion rate holding steady at about 73 percent.

**Export**—Export of waste tires continued to grow rapidly in 2009 to an estimated 3.3 million PTE, with anecdotal reports of even more rapid growth in exports during 2010. If this trend continues it could increase the tire diversion rate higher than the projected levels discussed above. However, this category was assigned no priority in this report indicating that it is not a segment CalRecycle or stakeholders have expressed an interest in fostering.

**Ground Rubber**—Overall, ground rubber production was down about 15 percent; however, RAC increased by 7 percent and loose-fill playground/bark/mulch increased by 12 percent. Moreover, new ground rubber capacity equal to about 40 percent of 2008 production also came online. These trends indicate that ground rubber may continue to grow rapidly in coming years, unless some threats identified above materialize.

**Civil Engineering**—Overall, civil engineering declined by 37 percent compared to 2008. However, some of this is a result of changes to reporting procedures. In the next market study CalRecycle intends to adjust and clarify guidelines for what "counts" as civil engineering.

**Tire-Derived Fuel**—Tire-derived fuel was down 6.8 percent in 2009 compared to 2008, a surprisingly positive result given that cement production was down substantially as a result of the economic downturn. In 2010, one plant has closed, and there are reports that a second plant may soon be closing. Moreover, a proposed U.S. EPA rule that would classify TDF as municipal solid waste, which appears likely to be adopted, would significantly raise the compliance costs for cement plants using TDF and may well result in this market being vastly reduced or even eliminated in coming years. This could affect up to 5.4 million PTE of market diversion based on the 2008 market analysis.

Given the uncertainties in the market place, it is not surprising that the above trends run counter to the overall 2015 projections presented in this report section. However, it is quite possible that many of the projections may still prove to be on target. And in any event, it is the opinion of the report authors that the overall conclusions and recommendation of this report as presented in Section 7 remain justified.



# Section 4

## Evaluation of Programs and Options for Consideration

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### *Introduction*

As described in Section 2, recycling market development programs aim to expand demand and generally strengthen the market place to maximize and sustain high recycling rates. Whether in California or other states, and regardless of the particular recyclable commodity targeted, there are six basic mechanisms that recycling market development programs can employ to achieve these goals. Each of these is listed and described in Table 4-1. Each of these six mechanisms has a role in addressing specific types of barriers that retard recycling markets, and/or proactively catalyzing firms to seize on certain opportunities. The first five mechanisms are discussed in this section. Policy mechanisms are discussed in Section 6.

Organizing the program evaluation around the basic market development mechanisms rather than CalRecycle's current program activities as defined in the Five-Year Plan enables a systematic, integrated approach that helps ensure all options for addressing barriers and expanding priority expansion opportunities are considered.

Table 4-2 summarizes the CalRecycle waste tire market development programs reviewed and the basic market development mechanisms each employs. The primary mechanism each program employs is indicated by double checkmarks (✓✓) and secondary mechanisms employed are indicated by a single checkmark (✓). Each program is described and evaluated in the sub-section pertaining to its primary mechanism, but may also be mentioned briefly in other relevant sections as well.

Appendix E lists CalRecycle tire program budgets through 2013/14, based on the current Five-Year Tire Plan.



**Table 4-1. Recycling Market Development Mechanisms**

	<b>Funding Assistance</b>	<b>Research &amp; Development</b>	<b>Business &amp; Technical Assistance</b>	<b>Outreach &amp; Promotion</b>	<b>Education &amp; Training</b>	<b>Policy</b>
Main Purpose	Provide money to incentivize and/or support infrastructure development and specific activities.	Address gaps in available information, data, experience and technologies/ approaches.	Address barriers related to a specific business, agency or other organization's needs related to business and operational efficiency/growth.	Address attitudinal and behavior related barriers, and broad awareness/information barriers.	Address barriers related to an industry sector's information and training needs.	Define the rules that govern waste tire management and market development.
Examples of Program Activities	Grants, loans, rebates.	Partnerships with universities and trade associations; targeted projects and demonstrations.	Technical expertise, business to business facilitation, marketing assistance, product testing, tools, templates.	Media outreach, written materials, brochures, conference outreach, presentations, etc.	Workshops, training sessions, manuals, webinars, seminars, tours, videos, etc.	State statutes and agency regulations/ program rules to implement statutes.
Application Level	Usually retail (e.g., assistance targeting specific organizations).	Usually wholesale (i.e., providing publicly available results needed by several industry players) but can be retail (i.e., when specific companies receive funding for narrow projects).	Retail (e.g., assistance targeting specific organizations).	Usually wholesale (e.g., outreach campaigns) but can be retail (e.g., Lunch and Learn Sessions).	Wholesale (e.g., sessions targeting processors or playground installers).	Wholesale (i.e., can affect all any of the other mechanisms).

The following subsections review and evaluate the CalRecycle programs listed in Table 4-3, organized by market development mechanism. Under each mechanism, we first provide an overview of programs. Next we present a two-pronged evaluation of the programs. Under effectiveness and lessons learned, we evaluate, to the extent possible based on available data and information, how effectively the mechanisms have been utilized (through CalRecycle's programs) to achieve the goals and desired results presented in Section 2. And, under options for addressing current and future barriers, we identify which market penetration barriers presented in Section 3 could be addressed by each mechanism, and list current and optional programmatic approaches for doing so. Finally, we describe key implementation issues that must be considered. Generally, these issues relate to the guiding principles presented in Section 2 (e.g., ensuring that programs result in new demand, not moving materials from one market to another). In Section 7 the options presented in this section are evaluated and prioritized.

**Table 4-2. CalRecycle Market Development Program Activities Evaluated**

<b>Program/Activity</b>	<b>Financial Support</b>	<b>Research and Development</b>	<b>Business and Technical Assistance</b>	<b>Outreach and Promotion</b>	<b>Education and Training</b>
RAC Technology Centers			✓✓	✓	
RAC Grants	✓✓			✓	✓
RAC Technical Assistance Contract			✓✓	✓	
TDA Civil Engineering Technical and Construction Management Support	✓		✓✓	✓	
TDP Grants	✓✓				
Tire Equipment Loan Program	✓✓				
Research and Development Projects		✓✓		✓	✓
TBAP Business Assistance Grants	✓	✓	✓✓		
TBAP Sector-Wide Projects			✓✓	✓	✓
Outreach Campaigns				✓✓	
Tire Events				✓	✓✓
CalMAX, WRAP, and SBRAC				✓✓	
Commercialization and Applied Technology Grants <sup>1</sup>	✓				

<sup>1</sup> Program no longer exists but is included for historical perspective.

## ***Funding Assistance***

### **A. Overview of Funding Assistance**

Use of funding is the primary tire recycling market development mechanism employed in California, and is typically allocated well over half of the total market development budget. CalRecycle provides financial support to public entities (generally counties and municipal governments) to stimulate and support demand for tire-derived products in the form of grants. In the past, processors and manufacturers of tire-derived products were offered equipment grants as well. CalRecycle provides financial support, in the form of equipment loans. CalRecycle also supports processors and TDP producers through business assistance grants provided through the Tire-Derived Product Business Assistance Program; this program is evaluated under the Business and Technical Assistance section below. The following programs that primarily use(d) funding to advance TDP markets are discussed in this section:

- Tire-Derived Product (TDP) grant program;
- RAC and Chip Seal Grant Programs;
- Tire Product Commercialization and Applied Technology Grant Program (now discontinued but evaluated for completeness);
- Tire Business Assistance Grants (which is primarily a technical assistance program, but is included within this section to mention aspects of the program that provide funding); and
- Tire Equipment Loan Program.

Table 4-3 shows the budgets for current tire market development funding assistance mechanisms (excluding the TBAP grants, which are considered a technical assistance program, for FY 2009/10 – 2013/14.

**Table 4-3. Annual Budgets for Tire Market Development Funding Assistance Mechanisms FY 2009/10-2013/14<sup>1</sup>**

<b>Fiscal Year</b>	<b>RAC Grants (\$)</b>	<b>Chip Seal Grants (\$)</b>	<b>TDP Grants (\$)</b>	<b>Equipment Loans<sup>2</sup> (\$)</b>	<b>Web-Based Grant Mgmt. System (\$)</b>	<b>Total (\$)</b>	<b>Total Annual Funding Assistance as a % of Total Mkt. Dev. Budget</b>
<b>2009/10</b>	3,850,000	2,000,000	3,300,000	4,000,000	150,000	13,300,000	62%
<b>2010/11</b>	3,509,334	2,000,000	3,400,000	4,000,000	0	12,909,334	59%
<b>2011/12</b>	3,600,000	2,000,000	3,400,000	4,000,000	0	13,000,000	59%
<b>2012/13</b>	3,500,000	2,000,000	2,000,000	0	0	7,500,000	55%
<b>2013/14</b>	2,500,000	1,500,000	2,000,000	0	0	6,000,000	45%
<b>Five-Year Total</b>	<b>16,959,334</b>	<b>9,500,000</b>	<b>14,100,000</b>	<b>12,000,000</b>	<b>150,000</b>	<b>52,709,334</b>	<b>56%</b>
<b>% of Five- Year Market Development Budget<sup>3</sup></b>	18%	10%	15%	13%	0.2%	56%	

\* Subject to approval by the Legislature and Governor

<sup>1</sup> Based on budget presented in the Fifth Edition Five-Year Plan.

<sup>2</sup> Loans are not expenditures in the same sense as grants, as loans are expected to be repaid, currently with an interest rate of 4%.

<sup>3</sup> Market Development Total Budget does not equal Market Development Budget Total in Five-Year Plan, as this total excludes broad programs that are, in actuality, not market development programs, and includes research projects that aid market development (which are included as a separate budget item in the Five-Year-Plan) Budget excludes administration costs.

As Table 4-3 shows, funding assistance mechanisms comprise between \$6 million and \$13.3 million annually. For fiscal years 2009/10 through 2011/12 this is approximately 59 percent of the total tire market development budget. That percentage declines to approximately 45 percent by 2013/2014. This decline over time is due to the fact that equipment loans are not budgeted beyond FY 2011/2012. Again, the loans should not be considered an actual expenditure in the same sense as grants, as they are expected to be repaid.

Following is an overview of the key funding program and activities listed in Table 4-3:

### **TIRE-DERIVED PRODUCT (TDP) GRANT PROGRAM**

The TDP grant program allows public entities, low-income housing developments, and low-income schools to apply, on an annual basis, for funding for projects/products that consume at least 2,500 California-derived waste tires. Examples of products that can be funded through the grant program include playground surfacing, mulch, sidewalks and walkways, railroad ties, sound barriers, tracks, weed abatement coverings, and accessibility ramps. Grant costs are based on the cost of materials only, not labor costs. There is a \$5.00 maximum per tire diverted, however in recent years the average grant cost per tire diverted has been in the \$3.69- to \$4.50-per-tire range. Grantees are reimbursed for the product during or after the installation process. Ten percent of the grant amount is retained until the final report is submitted. The grantee must provide two progress reports and one final report during the grant process, and must display a permanent sign at the site of the project identifying CalRecycle's sponsorship. Grantees have two years in which to complete the projects. The maximum per-project grant amount is \$150,000 for small entities and \$250,000 for large entities.

Tire-Derived Product Grants have been offered since the late 1990s, however the program has evolved steadily, most significantly in the 2003/06 timeframe, to:

- Expand the types of products eligible for grants (beginning in the 2005/06 grant cycle) to all types of tire-derived products (not just playground cover and track/recreational surfacing) as long as they meet grant requirements;
- Base project funding assistance limits on number of tires diverted and size of entity, rather than on the purpose of the project;
- Streamline the application process and offer an online grant process;
- Select recipients based on a lottery of all eligible applicants vs. based on a ranking of scored applications or geographic considerations;
- Gradually reduce the per-tire diverted maximum reimbursement rate from \$15.00 to \$5.00; and
- Allow some private entities (e.g., low-income schools and low-income housing projects) to apply for grants.

Also of significance is the fact that prior to the passage of SB 876 in 1999, funding was much lower and the program was limited to emphasizing parks and playgrounds, due to use of proceeds from a parks bond. SB 876 established the current up-front fee levied on the purchase of a new tire (versus the previous fee levied upon disposal of a used tire) and allowed for the program's expansion in 2001 after new funding became available and the First Five-Year Plan was adopted.

In the Fifth Edition (FY 2009/10 through FY 2013/14) Five-Year-Plan, the budget for the TDP Grant Program ranges from \$2 million to \$3.4 million annually, or an average of 15 percent of the annual

market development budget. The program staffing level is reported to be two full-time staff plus 0.25 full-time equivalent (FTE) for a supervisor.

### **RUBBERIZED ASPHALT CONCRETE (RAC) GRANT PROGRAMS**

Rubberized Asphalt Concrete (RAC) Grant Programs were developed to encourage local governments to use RAC in their road construction projects. There are currently three separate grants in the RAC Grants Program, including:

**Targeted RAC Grants**—For communities using RAC for the first, second, third, or fourth time. The reimbursement rate is higher for those with less RAC use experience, in an effort to help them overcome barriers associated with using RAC.

**Use RAC Grants**—For communities that have used RAC at least four times before. Projects are reimbursed at a lower rate, but are designed to help communities that have experience with RAC “bridge the gap” between the cost of traditional materials and RAC products, with a \$5-per-ton grant, up to \$250,000 per project.

**Rubberized Chip Seal Grants**—Introduced in FY 2007/09 to provide communities that do not plan on re-paving with a different opportunity for using a tire-derived product as a road maintenance strategy. Typically done to extend the life of a roadway before it needs to be re-paved. The chip seal application uses far fewer tires relative to RAC, but it is hoped that it will expose a different market segment to RAC products.

The RAC program has evolved over time. Significant changes in recent years include:

- Development of different RAC grants—One for first-time users, one for repeat users of RAC (funded at a lower level) and one for chip-seal users. For example, under the Targeted RAC grant program, reimbursement is based on the following:

<b>Number of RAC Grants Received in Past</b>	<b>Price Differential Reimbursement Rate<sup>1</sup></b>
0	100%
1	70%
2 or 3	40%

<sup>1</sup> Grantees are provided a rebate on the difference they paid for the RAC material vs. what they would have paid for traditional materials. They are reimbursed at a rate of 100 percent of this cost differential for their first grant, 70 percent for their second grant, and 40 percent for their third or fourth grant.

- Consolidation of the three programs (in FY 2008/09) to include all three types of grants in one program.
- Development of the Chip Seal Grant Program (in FY 2007/08). This program also has a tiered reimbursement rate structure, as described in the table below.

Number of RAC Chip Seal Grants Received in the Past	Reimbursement Rate
0 – 2	\$1.00 per square yard
3 or more	\$.20 per square yard

- Change minimum chip seal usage from 35,000 square yards to 1,250 tons per project.

The RAC and chip seal grants combined are budgeted at \$4 million to \$5.85 million per year for the FY 2009/10–2013/14 timeframe, which is an average of 28 percent of the annual market development budget. There is 3.5 to 3.75 full-time equivalent staff (including 0.5 to 0.75 FTE supervisors) dedicated to operating this program.

### **TIRE PRODUCT COMMERCIALIZATION AND APPLIED TECHNOLOGY GRANTS**

In contrast to the grant programs described above that aim to increase demand for select product types, the Tire Product Commercialization and Applied Technology Grants Program (Commercialization Grants Program) provided funding assistance to tire processors and manufacturers designed to help commercialize the supply of all types of tire-derived products. Although the program no longer exists, R. W. Beck examined this program in order to contrast it with current grant programs and provide a full picture of how CalRecycle tire grant programs have evolved. The program awarded 40 grants totaling approximately \$7.4 million between FY 1998/99 and FY 2003/04, but was re-evaluated in FY 2004 and ultimately restructured as the current TBAP Program, and later complemented by the Tire Equipment Loan Program. The program purpose was to reduce some of the market risk that private entities would otherwise face in manufacturing tire-derived products made from California-generated waste tires, thereby helping to bring new products into the marketplace. The program aimed to help processors and tire-derived product manufacturing businesses emerge. Many of the grants were for the purchase of equipment.

The Commercialization Grants Program was canceled due to several concerns. CalRecycle staff indicated that, while it was successful at encouraging businesses to enter the tire-derived product manufacturing industry, it resulted in grants going to some businesses that were high-risk (e.g., little or no experience in the industry). Further, the amount of grants was based on the amount of tires they anticipated processing, which was speculative in nature, and in the applicants' ability to write a good application, which might not be indicative of their ability to run a successful business. Finally, the program did not involve independent due diligence to confirm whether the stated needs were really a top priority for the applicant firm or the industry as a whole. Staff also observed that, as businesses began to emerge and the industry's infrastructure developed, businesses had a variety of needs beyond funding for equipment that were not being addressed. For all of these reasons the program was discontinued in 2004 and replaced by the TBAP program, described next.

### **TIRE-DERIVED PRODUCT BUSINESS ASSISTANCE PROGRAM (TBAP)**

The Tire-Derived Product Business Assistance Program (TBAP) is primarily a technical assistance program, and is therefore described in more detail in that section of this report; however it is mentioned here because it also provides some funding assistance, as a secondary mechanism, and because it evolved from the Tire Commercialization Grant Program, which is described in this section.

TBAP is designed to target state funds to the unique operational needs of firms in the TDP supply chain. The state implemented TBAP in 2005 to address the above concerns related to the Commercialization and Applied Technology Grant Program and better allocate state funds to meet

targeted industry and business needs. In the TBAP program, business applicants are awarded services to be provided via a multidisciplinary contractor team, with limits on the dollar value of each assistance package. Based on the findings of an independent needs assessment, an appropriate package of services is negotiated and funded through the program for each business. In the first two program cycles, a portion of grant funds could be used for equipment purchase and 12 firms were awarded a total of \$1,003,750 in equipment grants. In the third program cycle, rules were adjusted and equipment purchases became ineligible. Consequently, TBAP is now primarily a business and technical assistance mechanism and is described more fully in that section below. However, there are instances when businesses receive grants in order to access services they otherwise would not be able to afford, such as website development, trade show registrations, product testing, and development of marketing materials, which can therefore indirectly provide funding support to participants.

### **TIRE EQUIPMENT LOAN PROGRAM**

CalRecycle's Tire Equipment Loan Program is designed to address the challenges faced by tire processors and producers of all types of TDPs in accessing capital, and replaced the discontinued commercialization grant program and the equipment grants that were provided in the first two TBAP business grant cycles as a mechanism to assist firms in purchasing equipment. While tire recyclers located in one of the 40 designated Recycling Market Development Zones (RMDZs) have always been eligible for low-interest loans, in fiscal year 2009/10 CalRecycle announced a new loan program specifically for tire manufacturers and processors regardless of their location. The program relies on the staff and lending rules used by the RMDZ loan program, and encourages California-based tire businesses to locate new facilities and expand existing operations by providing low-interest rate loans for equipment purchases and other specified needs.

To date, under the new program CalRecycle has issued loans to four businesses – one start-up and three existing companies – which are anticipated to result in a combined additional processing capacity of 4,310,000 tires annually, while creating 37 new jobs.

Staff indicate that, to date, there have been no problems with loan repayment. They expect to recoup the entire loan amount plus interest. Recovered funds are allocated to the tire fund.

The equipment loan program is funded at a level of \$4 million per year, for FY 2009/10 through FY 2011/12, which is approximately 18 percent of the market development budget for each of those years. However, this funding is expected to be paid back to CalRecycle, with an interest rate of 4 percent. There is one full-time staff person dedicated to operating this program.

### **B. Funding Assistance Effectiveness and Lessons Learned**

Table 4-4 provides a summary of selected available results and characteristics associated with the CalRecycle tire programs that use funding assistance as a mechanism for market development. Key quantitative measures of effectiveness with regard to funding assistance mechanisms are PTEs diverted and cost per PTE diverted. R. W. Beck reviewed grant reports and databases provided by grant staff, agenda items, and interviewed staff as necessary in attempt to determine PTEs actually diverted as a result of receiving CalRecycle funding assistance. It is our conclusion that there is insufficient data upon which to base such determinations uniformly for all time periods and particularly for the most recent time period, given that recent applications of funding have not yet had the time to demonstrate resultant PTE diversion. Consequently, what is presented in Table 4-4 presents the best fit of available data aimed at determining diversion and cost per PTE results for each funding assistance program based on program applications. Notes at the bottom of the table explain the sources of this information.



**Table 4-4. Characteristics of Tire Market Development Funding Assistance Programs Based on Approved Applications**

	<b>Actual Diversion (PTEs)<sup>1</sup></b>	<b>Range (Average) Cost PTE Diverted<sup>2</sup></b>	<b>Total Annual Grant/Loan Awarded<sup>3</sup></b>	<b>Total Annual Grant/Loan Expenditure</b>	<b>Timeframe Included (FY) <sup>4</sup></b>
Tire-Derived Product Grants	462,678 – 727,674	\$3.95 - \$4.98 (\$4.35)	\$2.7 - \$4.3 million	\$2.3 - \$3.0 million	2005/06 – 2009/10
RAC Targeted Grants	235,106 – 374,894	\$9.13 - \$10.17 (\$9.51)	\$2.9 - \$6.9 million	\$2.2 - \$3.8 million	2005/06 – 2009/10
RAC Use Grants	396,430 – 746,843	\$1.07 - \$2.05 (\$1.43)	\$1.3 - \$2.5 million	\$0.5 - \$1.4 million	2003/04 – 2008/09
Chip Seal Grants	172,798	(\$12.32)	\$2.5 - \$3.1 million	\$2.1 million	2007/08 – 2009/10
Equipment Loan Program <sup>5</sup>	4,310,000	\$0.40 - \$2.00 (\$1.13)	\$3.9 million		2009/10
Waste Tire Commercialization Grants	NA	NA	\$0.3 - \$3.1 million		1998/99 – 2003/04
<b>TOTAL ANNUAL</b>	<b>5.6 – 6.3 million</b>	<b>\$0.91 - \$12.32</b>	<b>\$11.6 - \$23.8 million</b>		

<sup>1</sup> Based on closed grant cycles through FY 2007/08, except for the Equipment Loan Program which is based on estimates.

<sup>2</sup> Awarded figures based on all grant cycles through FY 2009/10.

<sup>3</sup> Expended figures are based on closed grant cycles through FY 2007/08.

<sup>4</sup> Timeframe is from the beginning of the respective grant or loan program to the most recent cycle. There were no RAC Use Grants approved for funding in FY 2009/10 due to available monies being used for the RAC Targeted Grant program.

<sup>5</sup> Based on four loans to tire processors under the Tire Equipment Loan Program in the 2009/10 fiscal year. Equipment loans are expected to be reimbursed 100 percent, plus interest (currently 4 percent). Therefore, the equipment loan program may actually be a net revenue generator. It is not known, however, the extent to which companies receiving loans would have received loans through the private sector if they had not received the loans through CalRecycle. Diversion figures for the Equipment Loans are for annual capacity versus the one-time diversion figures for the grant programs.

It is important to note that the costs per tire diverted in the above table are not all directly comparable in some cases, due to differences in program design. For example, grant programs reimbursing customers for TDPs are designed to increase demand, and involve a direct correlation to PTEs diverted (assuming the grantee would not have purchased the products without the funding assistance). Funding for equipment is designed to increase raw material supply, and may increase a firm's production capacity (not necessarily the actual number of tires diverted in practice), or may provide other benefits, such as increased production efficiency or enhanced product quality. Also, it is important to recognize that certain types of market development activities cost more than others by nature—especially when pertaining to newly emerging and less mature market sectors. For example, research and development may not lead to substantial PTEs diversion in the short term, but could lead to opening new market opportunities that could divert PTEs in future years. One simply cannot evaluate the effectiveness of the use of funding assistance mechanisms on the basis of cost relative to PTEs diversion alone.

With those caveats, if one assumes that the values in Table 4-4 are accurate, and based on PTEs diverted and cost per diverted PTE alone, then the equipment loans program appears to be relatively cost-effective. This program merits closer examination and possible expansion, given its apparent cost-effectiveness.

On the other end of the spectrum, it appears that the chip seal grant program is not cost-effective relative to other grant and loan programs. The program is designed to introduce new uses for ground rubber (and therefore may be expected to have a relatively high unit cost). However, unless substantial potential for significant, sustainable use outside of the grant program is demonstrated to warrant such high costs relative to PTEs diverted, this program should be modified to improve cost-effectiveness or perhaps eliminated altogether.

Qualitative measures of effectiveness are discussed below and generally reflect the extent to which funding assistance mechanisms have helped to achieve the desired outcomes in building a healthy and thriving California tire marketplace as described in Section 2.

The following can be said regarding the grant and loan program effectiveness:

- There has been sustained interest in TDP grants. The program received more than \$6 million in qualified requests for FY 2008/09. Therefore, the state agreed to allocate an additional \$3.3 million from 2009/10 to fund an additional \$3.3 million of eligible TDP grant applications submitted by 37 entities (school districts, local government departments, and one community college district). The interest in loans indicates some level of awareness in the TDPs and in the grant program, and the fact that local governments see the grants as worthwhile.
- There has also been sustained interest in RAC grants—the program received qualified requests for \$13.5 million in 2008/09 (for \$7 million in allocated funds). The state therefore agreed to allocate 2009/10 grant funds to 25 eligible targeted RAC grant applications totaling \$3.85 million, and to allocate 2009/10 grants to fund 11 chip seal grants totaling \$2 million. The fact that organizations applied for the RAC and chip seal grant funds in and of itself increases awareness of RAC, and the funding makes using RAC and chip seal more economically attractive. It also indicates a growing level of awareness regarding RAC and the grant program.
- The TDP grant program appears to have resulted in a fairly diverse level of interest in recreational and agricultural/landscape products, although playground surfacing tends to be the most common product type. The diversity shows that applicants have knowledge of the broad array of tire-derived products available and that some TDP producers have leveraged

the program in their sales and marketing activities. In TDP 9 (2009/10), for example, the following projects were awarded:

<b>Product Type Funded by TDP Grant</b>	<b>Number of Grants</b>
Playgrounds	22
Tracks	4
Sidewalks/Pathways	3
Artificial Turf	2
Tennis Court Surfacing	2
Floor Mats/Tiles	3
Mulch/Bark	7
Tree Care Products	2
Horse Stall Mats/Arenas	2
Weed Abatement Coverings	1

- Several California processors and TDP producers cite in survey results and solicited feedback that the state product grants have been critical to their sales and marketing efforts. On the one hand, funding assistance has helped to build the processing and product manufacturing infrastructure to convert tires into usable products; however, we were unable to determine to what extent this growth would have occurred without funding assistance, or whether the companies receiving funds would not be viable in the absence of grant funding availability. This latter question, while important, remains unanswered based upon the information available at this time.
- Grantees in past surveys have reported general satisfaction regarding the performance of the TDPs they install, as well as the grant process overall. This growing experience has contributed to consumer/buyer awareness of the uses for and benefits of TDPs in California. Local and state agencies have gained positive experience with using TDPs that may not have otherwise occurred. Outside of the grant program, in FY 2007/08, 51 state agencies reported purchasing nearly \$3 million in tire-derived products (as reported through the SABRC system).

In response to concerns about funding assistance serving to subsidize versus stimulate markets, staff has worked over time to modify the grant application requirements and review process. The RAC program has been restructured to support, at a higher funding level, funding assistance for first-time users, which has been effective in broadening the scope of RAC users. Because Caltrans is now required to use a certain percentage of RAC, a financial incentive is not required to drive its use. For this reason, the grants are aimed at supporting local governments' use of RAC. The equipment loan program has also been developed to help businesses fund the purchase of equipment to help them expand their capacity or develop production capabilities while returning funding back to the state for reallocation to other loan recipients.

It appears that the grant programs have been successful in helping expand the use of RAC, particularly in the southern portion of the state, as the southern Technology Center indicates that RAC is well-known, and is being used by many communities in that part of the state. The center

indicates that the northern part of the state may still need more assistance. Funding assistance appears to still be useful in encouraging communities to try some of the newer RAC products.

In addition, TBAP grants have helped some businesses obtain specific services (such as product testing and website development) that they may not have otherwise been able to obtain. Equipment grants and loans have helped develop and augment the processing infrastructure and supply chain. One-time funding assistance for business and infrastructure development such as feedstock conversion or website development are considered by economic development experts to be preferable to ongoing support, in that funding recipients do not develop dependency on such types of funding.

The grants to product users appear to have served as an effective means to encourage users of the products to try the product even when upfront costs are higher and to overcome their initial fears/lack of knowledge, etc. While an intention of these grants, it is unclear to what extent grant recipients will return to using the tire-derived product because they are satisfied with the quality, performance, and enhanced benefits the product provides over traditional products. Some but not all grant recipients have indicated that they will do so in surveys undertaken by CalRecycle staff. Anecdotally, staff indicates that many communities in the state continue to use RAC without grant funding, due to the benefits of the product, yet there is little quantitative data to support this. For some products that are sold widely in other states without grant support, it is likely that in at least some cases CalRecycle grant-supported sales may have occurred without the funding provided. For example, some TDP grants have supported the sale of artificial turf products. Staff indicates that artificial turf grants only provide funding assistance for the ground rubber infill (not labor or the artificial blade materials), and therefore only cover a relatively small portion of the product costs. This fact, combined with the wide acceptance of the product in other states without grant support, indicates—but does not conclusively demonstrate—that grants may not be a strong driver of artificial turf sales for many local agencies.

Funding assistance has helped establish a steady and diverse demand for tire-derived products, primarily targeting the public sector. However, some market sectors have not been aided by funding mechanisms. For example, there has been no grant program established for TDA, although several TDA technical assistance projects have been undertaken that have included provision of the TDA required to complete the project. To date there have been no financial incentives for TDA use at landfills for civil engineering projects, with the exception of three technical assistance projects that have provided the TDA for those projects.

The question of which product and customer types require grant support and which do not requires additional research to answer. For example, some indicate that RAC may be self-sustaining, and CalRecycle's focus on assisting new users as opposed to continuing users of RAC is therefore on target. With targeted grant funds unavailable for 2009/10 (due to their early allocation in 2008/09), CalRecycle is presented with an opportunity to try to identify whether local governments continue to use RAC without the assistance of grants during the 2009/10 and 2010/11 timeframe, or if the level of use decreases noticeably.

### **C. Use of Funding Assistance Mechanisms to Address Current and Future Barriers and Opportunities**

Funding assistance has historically been critical in developing markets for tire-derived products in California, but as markets mature, it is hoped that the state will become less reliant on their use to stimulate demand. Some funding mechanisms have been critical to develop a processing infrastructure. As the processing/manufacturing infrastructure has matured, this mechanism has

become less critical for businesses. While funding mechanisms are appropriate to help catalyze the marketplace, CalRecycle aims to ultimately develop a self-sustaining marketplace. Table 4-5 summarizes funding-related barriers and the ongoing funding mechanisms that have been implemented to address the barriers, as well as new programmatic options for CalRecycle's consideration.

Five potential new funding mechanisms are evaluated along with other potential new program/policy mechanisms in Section 6. Conclusions and recommendations based on the analysis in this section and in Section 6 are then presented in Section 7 along with options pertaining to other market development mechanisms.

**Table 4-5. Funding Related Barriers, Current Activities, and Programmatic Options to Consider**

Funding Barriers and Related Needs	Current Activities	Programmatic Options to Consider
<p><b>1. Less costly alternatives to TDPs may exist.</b></p> <p>Tire-derived products are not always the least-cost option to consumers, or may have higher up-front costs but be may be more cost-effective in the long run due to lower maintenance costs. The, geographic location of a project/end user can make use of a tire-derived product even less economical in comparison to use of conventional products.</p>	<ul style="list-style-type: none"> <li>• Stimulate RAC projects using grants so contractors respond to demand with additional equipment investments.</li> <li>• Provide equipment loans to RAC manufacturers/crumb tire producers.</li> <li>• Structure RAC grants to encourage gradual independence from state grants.</li> <li>• Provide TDP grants to state and local agencies.</li> <li>• Assist TDP suppliers in becoming more efficient.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide TDP supplier or consumer subsidies, i.e., a per-ton payment that incentivizes sales of tire-derived feedstock (e.g., crumb rubber or TDA) in lieu of traditional feedstocks.</li> <li>• Allow terminal blend rubber asphalt projects to qualify for grant funding to expand use.</li> <li>• Develop a retail coupon/rebate program to encourage purchase of tire-derived products (e.g., builders, private-sector entities, and households) at the retail level.</li> <li>• Implement a grant program for use of tire-derived aggregate in order to encourage local governments and private-sector developers to use TDA in suitable civil engineering applications such as retaining wall construction, pipe underlay, and sound damping.</li> <li>• Provide state agencies with a financial incentive to use (e.g., partial price rebate), or disincentive not to (such as additional reporting requirements) purchase more tire-derived products.</li> <li>• Provide targeted equipment grants to product manufacturers so that a more reasonable return on investment is assured for equipment needed to begin replacing other materials with tire-derived crumb rubber or TDA.</li> <li>• Provide funding priority or enhanced funding to select product types deemed critical to market expansion (e.g., feedstock conversion or other new uses).</li> </ul>

Funding Barriers and Related Needs	Current Activities	Programmatic Options to Consider
<p><b>2. Subsidized ground rubber imports compete with in-state ground rubber supply.</b></p> <p>Certain Canadian provinces and other states subsidize the production of tire derived ground rubber. Buyers in California, including Caltrans, may be offered lower prices from such suppliers, which could put California suppliers using locally generated tires at a disadvantage.</p>	<ul style="list-style-type: none"> <li>• Provide equipment loans for manufacturers/processors of California waste tires and tire-derived products.</li> </ul>	<ul style="list-style-type: none"> <li>• Incentivize the use of California TDPs among state agencies, and perhaps other end users when competition for out-of-state supply exists (e.g., by providing a price support or recognition program).</li> <li>• Provide a rubber feedstock supplier subsidy to help put California crumb rubber on an equal footing with subsidized crumb rubber from out-of-state.</li> </ul>
<p><b>3. Some projects that could utilize tire-derived products are located in areas distant from sources of supply.</b></p> <p>When transportation costs are high, the cost of TDPs can be higher than that of competing alternative feedstocks that are locally available. This is particularly an issue in the more remote areas.</p>	<ul style="list-style-type: none"> <li>• Implement a cooperative purchase program under the RAC expert contract awarded to Jacobs Engineering.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide a rubber feedstock transportation subsidy beyond the existing grant for entities purchasing specified materials located more than a certain distance from processors.</li> <li>• Identify locations where demand for TDA exceeds supply, and target producer incentives such as transportation or use subsidies in those geographic areas.</li> </ul>
<p><b>4. TDP industry stakeholders often lack the resources to invest in new technology and new product development.</b></p> <p>In order to achieve the state's 90 percent landfill diversion goal, technologies that lower the cost of supply and TDP product manufacturing as well as development of new products that use tire-derived feedstocks will be advantageous if not necessary.</p>	<ul style="list-style-type: none"> <li>• Provide a loan program for new equipment for processors/manufacturers engaging in new technologies or developing new products.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide a financial incentive such as narrowly targeted commercialization grants, new product development grants, and/or innovations grants for private businesses to develop and prove new technologies and new products, with possible support also available for universities that support this work.</li> </ul>

Funding Barriers and Related Needs	Current Activities	Programmatic Options to Consider
<p><b>5. TDP manufacturers lack resources to improve processing operations.</b></p> <p>Some manufacturers could improve their manufacturing/processing efficiency, improve product consistency and quality, and produce an expanded range of products if they had additional equipment.</p>	<ul style="list-style-type: none"> <li>• Provide low-interest equipment loans to processors, being careful to fund what would not have otherwise occurred without state funding.</li> <li>• Provide direct assistance to businesses to gain business or technical assistance.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide targeted equipment grants for market sectors that are under-supplied or face major financial barriers.</li> </ul>
<p><b>6. Demand for TDA fluctuates significantly and can be sporadic.</b></p> <p>Projects that may use TDA are sporadic in nature and generally need large quantities of TDA when they occur.</p>	<ul style="list-style-type: none"> <li>• Provide loans for TDA processors to purchase/update equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide a supplier or consumer subsidy to incentivize TDA production and sales, such as a small per-ton payment for processors and/or landfills to divert shredded tires from landfilling to ADC as a flexible market, so that tires bound for ADC can be redirected to TDA use and specifications when TDA projects arise.</li> <li>• Provide TDA grants to local agencies, similar to the current TDP grant program.</li> </ul>



#### **D. Funding Assistance Mechanisms—Implementation Issues and Considerations**

CalRecycle experience to date has highlighted several key issues and challenges associated with implementing funding assistance mechanisms. Following are some related considerations that CalRecycle should take into account going forward:

**Ideally, funding assistance should be structured to catalyze the marketplace and achieve sustainable demand, rather than providing an ongoing subsidy for activity that may occur without government support.** This is one of the main issues related to grants, and one that CalRecycle staff has sought to address by reducing the funding per tire over time, and by offering dual RAC grant programs, one for new users and one for established users. However, even when low funding is provided, grantees may come to rely on the grants to subsidize the purchase of the products. One option CalRecycle can consider is to continue to review and adjust grant programs with an eye towards: reducing the funding per tire; giving higher funding and priority to new TDP users; and giving higher funding and priority to products/projects that are determined to have long-term potential to become sustainable markets, while in need of a catalyst to demonstrate product benefits. Another option to consider is conducting a research project to develop a protocol for estimating overall sales of TDP product types, either in California or nationally (perhaps jointly with appropriate partners). This would provide a base of information to determine which products are enjoying strong sales without government support, and also would provide additional information to help track market development trends.

**New businesses and technologies can present a financial risk.** A challenge with respect to providing financial incentives for businesses to develop and prove new technologies is that there may be a fine line between providing funding assistance for a viable technology or one that is well on its way to becoming viable and providing funding for a technology that has no future. There is always some financial risk associated with newer, unproven technologies. The less risky approach is to support the use of technologies that have proven use in other applications but are newly applied to waste tires. In recent years CalRecycle has expressly sought to promote technologies and products with a clear potential for market acceptance. In the future, to further diversify the marketplace over the long term, CalRecycle could consider allocating a small portion of its funding portfolio to opportunities that may carry greater risk, but which may hold the potential to identify as yet unknown uses for waste tires.

**Funding assistance for processors could potentially contribute to a glut in the marketplace.** A challenge with providing funding to suppliers of rubber feedstock is that it may inadvertently result in overcapacity of supply relative to demand, causing a glut in the marketplace for a particular type of product, or in a particular area of the state. This is true of both grants and loans, although because loans involve due diligence, they may be less likely to have this result, and that loans support purchases that would not otherwise be made without state financial support. To address this concern, CalRecycle could consider expressly including an assessment of the need for additional supply capacity when considering loan applications, based on information pertaining to the level of market saturation/development of infrastructure should be considered. Another option is to narrowly target loans, or equipment grants if they are reinstated, to meet specific needs, such as the production of fine-grind ground rubber or TDA for civil engineering applications. Program staff with expertise in waste tire markets could assist loan staff in these assessments.

**The cost per tire for funding assistance varies and must be compared based on the specific objectives and products targeted.** Funding mechanisms seeking to entice new users of relatively

unproven products, especially those with relatively high up-front costs but potential long-term cost savings, should be expected to have a higher cost per ton than those seeking to encourage ongoing use of relatively established products. And, funding mechanisms aimed at suppliers generally increase capacity or enhance quality/production efficiency, and may not have as direct a correlation to actual new tires diverted than consumer grants. To address this issue, CalRecycle could clearly identify the objective of each funding program and targeted cost per tire levels over time that reflects the above considerations.

**Systematic and consistent grant follow-up is required to evaluate programs and leverage them in outreach and education activities.** This issue does not concern the mechanism itself, but performance measurements and other mechanisms which are covered below. Briefly, options for CalRecycle consideration include: 1) Preparing a year-end report summarizing results to date; 2) Preparing a select number of case studies annually using an established template that captures performance and cost information; and 3) Following up consistently with grant recipients to document actual TDP purchases made without state support.

## ***Outreach and Promotion***

### **A. Overview of Outreach and Promotion**

Outreach and promotion are mechanisms used by CalRecycle to build awareness of, and interest in, tire-derived products on the part of individual, institutional, retail, industrial, and governmental buyers/consumers. In addition, outreach and promotion activities are used to increase participation in CalRecycle tire programs. Outreach and promotion differs from education and training, which are mechanisms used to develop skills and knowledge on behalf of such entities as tire processing and TDP manufacturing personnel, TDP installers, and TDP users. Outreach and promotion efforts are often conducted in conjunction with education and training, as well as research and/or business and technical assistance efforts. CalRecycle includes a distinct outreach budget in the Five-Year Tire Plan that is administered through the Office of Public Affairs (OPA). Additionally, CalRecycle tire program staff and contractors conduct outreach as part of technical assistance contracts. With a number of different offices, contractors, and approaches to outreach, it can be very difficult to ensure that outreach and promotion are conducted in an efficient manner that is coordinated and complementary.

Below are OPA outreach activities described in the Fifth Five-Year Plan.

- **Tire Sustainability Outreach.** In December 2005, CalRecycle approved a scope of work for a tire sustainability outreach campaign and, in June 2006, awarded the two-year contract to Ogilvy Public Relations Worldwide. This contract expired in June 2008. Additional funds of \$2,083,801.50 were awarded to Edelman in April 2009 to continue to conduct outreach regarding sustainable tire practices. This two-year project was to be funded from the 2008/09 budget (\$1.2 million) and the 2009/10 budget (\$883,801). The project focuses primarily on changing tire maintenance behaviors of Californians, including proper tire maintenance, encouraging customers to leave used tires at the retail location, and the availability of longer-life tires. While included in the Market Development section of the Five-Year Plan, this is a source reduction outreach project that does not address tire market development goals. Hence we are not evaluating this campaign herein.
- **Tire Maintenance Outreach.** This \$75,000 campaign was geared toward increasing the number of truck tire casings that are retreaded and increasing the number of retreaded tires purchased. The outreach targets California-based trucking firms, fleet operators, companies with distribution facilities, and others that represent the majority of trucks on the road. This

campaign, which was awarded to the Tire Retread Information Bureau in January 2007 (Resolution 2007-10) is market development-oriented, focusing on increasing demand for retread tires. It was funded from the 2006/07 budget.

- **Green Roads Local Government Outreach.** Using public relations strategies modeled after successful efforts in Arizona, this statewide campaign managed by OPA aims to raise awareness about the benefits of rubberized asphalt concrete and tire-derived aggregate in civil engineering projects and generate demand among consumers and residents. Outreach activities target local jurisdictions as well as general public education, providing awareness about the benefits of these products and stronger advocacy for local jurisdiction uses. This work has involved two contracts. The first with Ogilvy had a budget of \$1.2 million (funded from the 2006/07 and 2007/08 outreach budgets), and the second with Katz and Associates for approximately \$772,000 (funded from the 2008/09 and 2009/10 outreach budgets).

Available data for 2007 and 2008 indicate that expenditures for public relations projects included \$760,576 for Ogilvy Public Relations in 2007, and an additional \$336,108 for Ogilvy Public Relations in 2008—for a total of \$1,096,685 for Ogilvy for that two-year period. In addition \$4,990 was spent on “Green Technology” in 2007.

In addition to the OPA outreach and promotion projects described above, CalRecycle program staff and contractors have also conducted outreach activities, generally of a far more technical and focused nature. These are described below.

**CalRecycle Tire Program Outreach to Promote Use of RAC and TDA.** Tire program outreach for RAC and CE uses has also been performed by the technical assistance contractors and CalRecycle staff. These programs are discussed in more detail in the Business and Technical Assistance section below, but are mentioned here because of their outreach component. These efforts are geared toward expanding the use of RAC and TDA for civil engineering applications by local jurisdictions and, in contrast to the OPA-managed projects, have a closer connection to technical education and training, and technical assistance. Outreach methods often involve websites, e-mail lists/listservs, workshops and meetings (though those may also serve educational purposes), and conferences. Through its current Green Roads contract, CalRecycle has recently launched a new Green Roads web-page that features information on TDA (with content developed in conjunction with the Kennec technical assistance contract) and RAC (with content developed in conjunction with the RAC technical assistance contract). Previously, as part of this program, an advisory group consisting of local government associations, industry associations, academia, technical experts, and state staff was formed to identify areas of the state that have not used RAC or TDA/civil engineering projects. The goal was then to identify proposed conventional projects within those areas that could be replaced with RAC or TDA.

**Outreach Activities Undertaken Through the Tire-Derived Product Business Assistance Program (TBAP).** The TBAP program is discussed in detail in the Business and Technical Assistance section below; however, TBAP “sectorwide” projects focusing on outreach and promotion are described here. These projects include:

- A Construction Database Project that evaluated and tested the use of various construction industry databases for targeting outreach and sales activities (\$75,000);
- Three closely coordinated projects titled Architect Outreach and Government and Green Building Sales Support Project that developed an online catalog comprised of company developed marketing materials, and will pilot outreach to government and private sector architects. The project also involves development of a tool kit to aid in marketing and selling

products to government agencies, education, and training components as described in that section below (total budget, \$375,000 over two successive TBAP contracts, ongoing); and

- An ongoing Industry Network and Collaboration project aimed at catalyzing collaboration among California processors and TDP producers, which is focusing on development of an industrywide website and trade show marketing activities. The proposed network will be initially known as the California Rubber Recycling Network (CRRN) (total budget, \$250,000).

**State Agency Buy Recycled Campaign.** State agencies and the Legislature are required to purchase recycled-content products within 11 product categories, and state agencies must report their purchases to CalRecycle on an annual basis. At least 50 percent of all purchases in each of these product categories must meet minimum recycled-content standards. One of the 11 categories is tire-derived products (including products such as flooring, parking bumpers, hoses and playground surfacing), and one category is tires. To assist agencies and the Legislature identify appropriate products for the State Agency Buy-Recycled Campaign (SABRC), CalRecycle has developed a listing of vendors that manufacture compliant tire-derived products. This information is available at [www.calrecycle.ca.gov/Tires/Products/ProdList.htm](http://www.calrecycle.ca.gov/Tires/Products/ProdList.htm).

**CalMAX** is a statewide waste exchange that aims to build reuse markets for materials from businesses, organizations, industry, schools, and individuals, and to find markets for non-hazardous materials that may otherwise be discarded. All types of materials are advertised, not just waste tires.

**Waste Reduction Awards Program (WRAP).** This recognition program is administered by CalRecycle. WRAP provides an opportunity for California businesses and nonprofit organizations to gain public recognition for their outstanding waste reduction efforts, and provides businesses with examples of successful waste reduction techniques, which they may adopt as their own.

The budget for both CalMAX and WRAP has remained level at \$24,666 for FY 2008/09 – 2011/12).

**General Outreach and Promotion.** Outreach is provided to potential grantees regarding upcoming grant opportunities and consists primarily of grant information being made available through:

- The CalRecycle website;
- Targeted e-mail lists;
- Request for publication in the privately published California Tire Report; and
- Activities at various conferences and workshops.

CalRecycle also uses its website and e-mail for outreach and promotion of tire program events and activities, and for distributing reports and documents developed by staff or its contractors. This method of reaching interested parties is low-cost, and is likely effective in reaching interested grantees and manufacturers. It is less likely, however, to garner the interest of someone who is new to tire-derived products, or who may be an end user of tire-derived products.

**Table 4-6. Promotion and Outreach Budget for 2009/10 – 2013/14<sup>1</sup>**

<b>Promotion and Outreach</b>	<b>FY 2009/10</b>	<b>FY 2010/11</b>	<b>FY 2011/12</b>	<b>FY 2012/13</b>	<b>FY 2013/14</b>	<b>Five-Year Total</b>
OPA Outreach Activities <sup>2</sup>	\$2,416,198	\$3,300,000	\$3,200,000	\$1,500,000	\$1,500,000	\$12,800,000
CalMAX and WRAP	\$24,666	\$24,666	\$24,666	\$24,666	\$24,666	\$123,330
<b>Promotion and Outreach Subtotal</b>	<b>\$3,324,666</b>	<b>\$3,324,666</b>	<b>\$3,224,666</b>	<b>\$1,524,666</b>	<b>\$1,524,666</b>	<b>\$12,923,330</b>
% of Total Mkt. Development Budget <sup>3</sup>	11.3%	15.2%	14.6%	11.2%	11.4%	13.0%
<b>Additional Programs and Activities With Outreach Components<sup>3</sup></b>						
TDA Civil Engineering Technical and Construction Management Contract	\$3,250,000	\$1,000,000	\$2,750,000	\$1,361,334	\$1,711,334	\$10,072,668
RAC Technology Centers	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$500,000
RAC Technical Assistance Contract	\$1,325,000	\$1,325,000	\$1,325,000	\$500,000	\$500,000	\$4,975,000
Tire-Derived Product Business Assistance Program (TBAP) <sup>4</sup>	\$0	\$2,500,000	\$674,334	\$2,000,000	\$2,500,000	\$7,674,334

<sup>1</sup> Based on budgets are presented in the Fifth Edition Five-Year Plan, May 2009.

<sup>2</sup> Known outreach budgets dedicated to non market-development projects are excluded.

<sup>3</sup> Portion of project/activity budget dedicated to outreach and promotion is unknown.

<sup>4</sup> TBAP budget figures include business assistance, sectorwide projects, and other authorized funding for contract related activities requested by CalRecycle.

## **B. Outreach and Promotion Effectiveness and Lessons Learned**

**Green Roads Local Government Outreach.** R. W. Beck did not receive any data or information for review that provided any quantification of results for the first Green Roads campaign contract, conducted by Ogilvy & Associates. On a qualitative basis, the Green Roads program began with a pilot project that identified important considerations in the design of the outreach campaign. A variety of publication materials were developed that appear to be general in nature and do not address technical details of importance to specifiers and engineers. Some parties interviewed indicated that coordination between OPA, state tire program staff, and contractors was insufficient to ensure proper messaging and targeting.

It is too early to draw conclusions regarding the effectiveness of the second and currently ongoing Green Roads campaign, with Katz & Associates as contractor, but it appears that an effective monitoring plan is being implemented for this campaign which should assist in evaluating and

learning from it. Katz & Associates has subcontracted with Action Research to conduct a statewide “before and after” telephone survey of adult residents to assess knowledge, attitudes, and awareness about tire-derived products in California. Specifically, the survey focused on residents’ knowledge, awareness, and attitudes about the use of RAC in highway construction projects and the use of TDA in light rail and other civil engineering construction projects. The study was designed to test potential campaign messages and establish a baseline to use for comparison following the two-year campaign. The survey will be repeated after the two-year campaign has been completed. The post-campaign survey will serve as an evaluation of the effectiveness of the outreach program at reaching the public and motivating residents to request the use of tire-derived products such as RAC and TDA in their communities. In addition, the post-campaign survey will provide information regarding the penetration of campaign messages. The approach that Katz & Associates is taking to design as well as evaluate the effectiveness of the Green Roads campaign should generate some quantitative results that will help to determine the effectiveness of this type of social marketing campaign, but since those results are not yet available, we cannot make such a determination.

CalRecycle tire program and OPA staff are also working to coordinate outreach activities undertaken through the ongoing Katz & Associates Green Roads. The contract includes a broad outreach component that does not appear to be targeted to top priority decision makers involved in specifying or allocating budget for TDA/civil engineering projects (i.e., public works directors, line engineers and landfill operators). However, the contract is also set to complement and strengthen more targeted outreach activities targeting these groups to be conducted by technical program staff and contractors, with marketing collateral prepared under the Katz contract. The contract may prove valuable in testing approaches to coordinating the two needed yet distinct components of outreach: technical expertise and outreach/promotional expertise.

**Tire Maintenance Outreach Campaign.** Tire Retread and Repair Information Bureau indicated prepared a kit under contract with the state (“Reputable Retreads”) which includes a DVD featuring product testimonials and a CD, and according to a representative of the bureau, it was reportedly well-received. The bureau has sent out over 3,000 kits, including one to nearly all local governments in the state, since it was completed in 2008. The representative indicated that he believed the project has been successful because he has seen an increase in the demand for /use of retread tires in California. However no actual data has been collected to provide quantitative measures regarding whether purchase of retreads has actually increased. This program is not a high-cost program relative to other outreach efforts. Reuse is listed as a low-priority market sector because it is believed to be near saturation. However, it is a highly economic and mature market segment, and modest resources allocations to assist in sustaining and growing it (to the extent possible) such as this project appear cost effective.

**CalRecycle Outreach to Promote Use of RAC and TDA.** These contracts are discussed in detail under the Business and Technical Assistance section below. However, briefly, they each involve outreach activities in the form of one-on-one phone calls, conference presentations, and electronic mailings, in addition to production of materials that serve an outreach as well as an educational purpose. The outreach components of these contracts are more modest than the Green Roads contracts, and the outreach is far more narrowly targeted.

As discussed further in the Business & Technical Assistance section below, the contracts appear to have been effective in steadily broadening awareness of RAC and TDA use opportunities and in expanding the technical understanding of cost and performance benefits and tradeoffs.



**Tire Business Assistance (TBAP) Program Outreach Activities.** The TBAP sectorwide projects are described more fully under Business and Technical Assistance below. Only outreach-related activities are addressed here. The Construction Database Project provided experience with two key information sources that can provide sales leads, and lead to the provision of these resources to California TDP producers through TBAP business assistance grants. The project tested the dissemination of five leads per month to select businesses (consistent with limits imposed by the database contractual agreement) and recommended opportunities for using the databases to plan marketing and sales opportunities. However, the main impact of the project to date appears to be in assisting businesses in their firm-specific marketing efforts through access to the information sources.

The Architect Outreach/Government and Green Building Sales Project is ongoing. To date, the project has provided outreach and training during three training sessions (one at the May 2009 International Tire Conference and subsequently through two webinars) that was well received, although detailed feedback by participants is not available. Turnout for the training sessions were modest, but very well received. TBAP participant surveys indicate that many TBAP business participants do not have a great awareness of the training sessions or materials currently available on the TBAP website. The overall project is framed as a pilot project that is testing the compilation of business marketing material into an online catalog and dissemination via “lunch and learn” sessions with architects. The online catalog is providing up to date information on California-produced TDPs and is also yielding important lessons regarding the further development of such catalogs in the future. While the project has yielded valuable lessons learned already to aid in building on the foundation established, a determination of whether the project can be viewed as effective in relation to the overall budget allocated must wait for its completion.

The third TBAP outreach project involves working with industry representatives through a steering committee in an effort to both implement two outreach projects and to determine the potential for further collaborative industry activities. This project is ongoing and a website is currently under development. The plan is to house the catalog described above on the industry website, and to expand and maintain it over time. The project appears to have strong momentum and is expected to provide a solid base for future collaborative activities. However, no outreach activities have yet been conducted.

**State Agency Buy Recycled Campaign (SABRC).** A review of the list of tire-derived product vendors listed on the SABRC web site suggests that this directory provides some information that is out of date, and may not be as useful as the information packaged in a form similar to the catalog now being developed through the Government and Green Building Sales Project, given its more detailed, up-to-date and company-endorsed materials. (However, the catalog is initially being limited to products relevant to green building customers.) There are other lists of suppliers of California tire-derived products posted on other state web pages, and all appear to include some out-of-date information. It would be more effective to support the development and maintenance of one up-to-date directory that serves multiple purposes, possibly complemented by or directly tied to an electronic catalog, than to try to support the maintenance of similar information in multiple locations. If the California Rubber Recycling Network project moves forward with the industry website and directory as described above, this will most likely be the most robust and useful source of information on California tire-derived products, their applications, and their manufacturers and suppliers. SABRC could then focus on a recycled content certification process, perhaps with links to the industry website for more detailed information, such as product source information and product cut sheets.

**CalMAX and WRAP.** These programs may have benefit to the state, but it does not appear that they have a track record of effectively helping to increase the movement of California waste tires from landfills into the marketplace. While they constitute a small fraction of tire program budget, ongoing support of these programs with funding from the tire program budget may not be justified, unless they are modified to better serve the needs of the tire program in line with the framework presented in this report.

**General Outreach and Promotion.** CalRecycle has a strong track record of performing outreach to encourage California tire industry involvement in using its programs as well as shaping the evolution of these programs. Numerous stakeholder engagement meetings are held and efforts to hear, respond to, and utilize stakeholder input and are well documented.

Outreach and promotion related to encouraging participants in the state's grant and loan programs appear to have been effective. Both RAC and TDP grants were oversubscribed in FY 2008/09, which is an indication of the effectiveness of related outreach efforts promoting these programs. And, TBAP business assistance grants were funded at their maximum possible levels. The new tire equipment loan grant received four applications the first round it was offered, which compares favorably to loan program applications historically received through the RMDZ Loan Program for all material types.

One area of general outreach and promotion that needs greater attention pertains to the CalRecycle tire recycling website. CalRecycle's web pages contain a vast amount of information; however, there remains an abundance of out-of-date information on the website and a need to streamline and better organize it to facilitate finding specific information when needed. As currently designed, it is not easily accessible nor user friendly and it takes substantial time for information to be added to the site. Ideally a highly functional and flexible website with continually updated industry information would be available to support market development efforts. The website being developed under the Industry Network project may provide an opportunity to play a role in tandem with the CalRecycle site.

Given the challenges and limitations inherent in a state website, seeding industry's development of a separate and complimentary website that will ultimately be managed and funded by the California tire industry, as is being pursued through the Industry Collaboration and Network project, appears to be an appropriate strategy and should improve the effectiveness of web based outreach and promotion. In addition, the effectiveness of the CalRecycle website could be improved if there was greater promotion of the website such as through an electronic newsletter that announces information that has been added to the site, with hot links to those publications.

### **C. Use of Outreach and Promotion to Address Current and Future Barriers and Opportunities**

Provided in Table 4-7 is a list of outreach/promotion barriers and current and potential options for conducting outreach/promotion to address those barriers. These options are considered in Section 7 to arrive at overall program evaluation conclusions and recommendations.



**Table 4-7. Promotion/Outreach Barriers, Current Activities and Programmatic Options to Consider**

Promotion and Outreach Barriers	Current Activities	Programmatic Options to Consider
<p><b>1. Lack of Knowledge about Tire-Derived Products.</b></p> <p>Many consumers, including state agencies, and those who influence purchasing decisions, are unaware of tire-derived products. This is particularly true for those that have not participated in the grant program previously and are not proactive in seeking such information, may not be aware that certain tire-derived products exist and are available in California.</p>	<ul style="list-style-type: none"> <li>• Maintain the CalRecycle tire program web pages, the SABRC website on tire-derived products and development of a new Infrastructure Information website that will include information on tire recycling businesses.</li> <li>• Support the development of a tire industry website that, once operational, will be maintained by the industry collaborative (California Recycled Rubber Network) being developed through Industry Collaboration and Networking Project.</li> <li>• Development of the UseTDA website, email lists/list serves, workshops and meetings to inform potential buyers of TDA availability and applications.</li> </ul>	<ul style="list-style-type: none"> <li>• Continue to support development of the industry website and coordinate with CalRecycle site to maximize overall effectiveness.</li> <li>• Expand well-coordinated one-on-one targeted outreach to specific TDPs to appropriate target audiences responsible for purchases and resource allocation. Examples include promoting TDA to public works officials and engineers, RAC to roads departments and construction TDPs to architects and specifiers. Bring the UseTDA website material to the CalRecycle website in an easy-to-find location or provide an external link to that website.</li> <li>• Build outreach capacity by leveraging relationships with local recycling coordinators, purchasing agencies, and RMDZ staff.</li> <li>• Expand outreach efforts to target out-of-state markets for California produced TDPs.</li> </ul>

Promotion and Outreach Barriers	Current Activities	Programmatic Options to Consider
<p><b>2. Attitudinal Barriers.</b></p> <p>Local Departments of Public Works and other government agencies are often entrenched in conducting business a certain way, with specifications that have “always” been used. As technical assistance results in the development of new state-level specifications, the new specifications, as well as success stories, need to be promoted directly to appropriate users and purchasers of TDPs including RAC and TDA in local governments and state agencies.</p>	<ul style="list-style-type: none"> <li>Promote the successes of demonstration projects and testing outcomes, particularly for RAC, additional rubber asphalt products being developed, and TDA in civil engineering applications.</li> <li>Promote the use of ground rubber as a feedstock in manufacturing molded products, and highlight and promote manufacturing successes.</li> <li>Conduct outreach to local agencies through the Green Roads (broadly) campaign and through more focused, technically-oriented outreach through the TDA and RAC technical assistance contracts.</li> <li>Promote the successes of demonstration projects and testing outcomes for TDA in civil engineering applications. Documents have included: <ul style="list-style-type: none"> <li>Green Roads, 2008</li> <li>New Uses for Old Tires – Public Works, 2002</li> <li>Tire Shreds: Solutions for Civil Engineers</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Annually compile case studies with testimonials and cost/performance data from grantees and other recipients of CalRecycle assistance. Broadly disseminate this information through a dedicated web page and through other outreach activities.</li> <li>Seek partnerships with trade associations to conduct outreach activities at events and in established publications.</li> <li>Enlist TDP producers, individually or through the new industry collaborative, as partners in outreach efforts. Offer an online life-cycle cost-savings calculator based on life-cycle cost research.</li> <li>Work with crumb rubber suppliers and TDP manufacturers to develop a testing/product quality rating system, and to promote that system to manufacturers and potential customers.</li> <li>Provide separate targeted outreach materials for each type of TDP application with case studies and a clear presentation of costs and benefits.</li> <li>Prepare summary documents from research reports in a format that provides the key results and is directed to potential project owners, designers, and specifiers.</li> <li>Promote TBAP services to processors and other firms interested in demonstrating effective TDA supply models.</li> </ul>

Promotion and Outreach Barriers	Current Activities	Programmatic Options to Consider
<b>3. Health/Environmental Concerns.</b>  Some past and potential future buyers/users of tire-derived products have concerns about the overall environmental and human health risks associated with tire-derived products.	<ul style="list-style-type: none"> <li>Provide access to and awareness of existing research studies for review by concerned stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>Maintain on a dedicated CalRecycle web page an up-to-date list of studies addressing the health impacts issue.</li> <li>As research is completed, disseminate results in a digestible format to potential end users/purchasers of products.</li> </ul>
<b>4. Need for Market Intelligence.</b>  Lack of awareness about potential purchasers of TDPs, RAC and TDA that are not currently targeted and lack of awareness of key barriers impeding diversion of tires and movement of tire-derived products into the marketplace.	<ul style="list-style-type: none"> <li>Hold stakeholder forums with representatives from the entire value chain.</li> </ul>	<ul style="list-style-type: none"> <li>Expand outreach efforts to include additional potential private-sector customers of TDA and RAC.</li> <li>Regularly update and publish a source of information on upcoming TDA projects, and leads on potential large users/sales opportunities for RAC and other TDPs.</li> <li>Adapt surveys to grantees to identify barriers to use of TDPs.</li> <li>Identify and characterize potential out-of-state markets of TDPs and top marketing/sales opportunities.</li> </ul>
<b>5. Lack of Awareness about Newer Technologies.</b>  Private entities, state agencies, and public officials that influence purchasing decisions that might benefit from the use of newly emerging technology may not do so because they lack information regarding such technologies and their applications.	<ul style="list-style-type: none"> <li>Work with contractors to promote new product and product applications at workshops and other appropriate forums.</li> </ul>	<ul style="list-style-type: none"> <li>Identify potential implementers of alternative technologies and ensure that they are kept aware of emerging technologies.</li> <li>Expand partnerships with appropriate groups such as trade associations or other government agencies that are viewed as credible information sources by select potential TDP customers.</li> <li>Consider creation of a university center to advance application of new technology.</li> </ul>

#### **D. Outreach and Promotion – Implementation Issues and Considerations**

CalRecycle experience to date has highlighted several key issues and challenges associated with implementing outreach and promotion programs. Following are some related considerations that CalRecycle should take into account going forward:

**Evaluating the effectiveness of outreach and promotion activities is costly, challenging, and essential.** Outreach and promotion activities, especially when broadly targeted to many groups with the objective of raising awareness, are notoriously difficult to evaluate. However, data on outreach activities and groups “touched” is always achievable, as is to some degree data related to the impact of outreach activities. Measuring the impact of more focused outreach efforts aimed at influencing purchasing behavior is somewhat more direct to measure than broader efforts. Before and after surveys related to purchase or investigation of TDPs, with assessment of attitudes and perspectives would provide a valuable source of information to help hone future efforts. R. W. Beck reviewed all available program performance information related to outreach and promotion activities. We found this information was lacking in some areas and inconsistent in others, and there was insufficient information upon which to base firm conclusions on outreach and promotion program effectiveness in most areas. CalRecycle could consider requiring in all outreach scopes of work an evaluation task. The current Katz & Association contract under the Green Roads Campaign provides an example that could be emulated. Further discussion on performance measurement is provided in Chapter 5, and we offer recommendations in Section 7.

**Outreach and promotion activities must be closely coordinated.** While there is some degree of coordination of outreach and promotion projects and activities, there is no one entity charged with coordinating outreach activities, stakeholder engagement, or development of a stakeholder engagement plan. To better ensure that these staff and/or contractors operate in synch, CalRecycle might want to consider developing an outreach and promotion plan that includes a stakeholder analysis and communication strategy, as well as schedules and assignments. The coordinated plan could be developed jointly by a small team (i.e., 2 or 3 individuals) representing technical program staff and OPA staff.

**Outreach and promotion, and education and training activities must be sustained over time and offered repeatedly to the same organizations.** Because of frequent management and staff changes, especially in local and state government, even when key decision makers are “sold” on a product or idea, they may be replaced by individuals with no background or knowledge about the subject. This is another reason to develop formal outreach plans and to include opportunities to “touch” groups repeatedly over time, from year to year. CalRecycle should consider this approach in an overall outreach plan.

**Targeted outreach and education activities need to use the right message to reach different stakeholder groups.** For example, experience indicates that outreach to decision makers (e.g., public works directors or Caltrans regional directors) needs to include a strong cost savings component in addition to performance benefits, while outreach to engineers needs to emphasize the practical issues related to launching and completing TDA projects. Outreach to the general public, if called for at all, should have a much broader, simpler message and an objective to raise awareness. CalRecycle should ensure that outreach programs are clearly targeted and that technical and outreach staff/contractors identify the “right” message for each target group as well as effective means of delivering each message. A stakeholder analysis can help to identify key target audiences and their different interests. Table 4-7 is an example of some of the information to be included in an outreach plan.

**Table 4-7. Examples of Marketplace Stakeholders for Target Market Sectors**

Tire Derived Products	Direct Buyers				Final Users/ Consumers	Purchasing Influencers/ Specifiers
	Government	Institutional	Retail/ Commercial	Other		
Athletic and Recreational Surfacing Products	Parks & Recreation Depts.	Colleges & Universities Day Care Centers Public School Districts Nonprofit Schools	Fast Food Establishments with Play- grounds	Athletic Clubs Developers of Private Stadiums	Athletes & Athletic Teams Students Children Parents	Design Engineers Health Departments/Agencies State and Local Purchasing Depts. Synthetic Turf Council IPEMA ASTM Professional & Trade Publications Media
Horticulture Products	Caltrans Buildings & Grounds Depts. Public Works Depts., Parks & Recreation	Buildings & Grounds Depts.	Home Improvement/ Lawn & Garden Supply Stores	Landscapers Private Grounds Maintenance Personnel	Home Owners Commercial & Institutional Building Owners Tenants	Landscape Architects State and Local Purchasing Depts. Sustainability Program Managers Cooperative Extension Offices State Nursery & Landscaping Associations Local Recycling Coordinators Professional & Trade Publications/Media

Tire Derived Products	Direct Buyers				Final Users/ Consumers	Purchasing Influencers/ Specifiers
	Government	Institutional	Retail/ Commercial	Other		
Asphalt/Road Products (from ground rubber)	Caltrans Public Works Depts. Paving & Road Construction Contractors	Colleges & Universities Public Schools		Developers of Neighborhoods and Business Complexes	Public at Large in addition to Buyers	Caltrans Roadway Design Engineers Rubber Pavements Assoc. Professional & Trade Publications/Media FHWA ASTM

## ***Education and Training***

### **A. Overview of Education and Training**

Education and training, as a recycling market development mechanism, is aimed at providing skills and expertise to individuals involved in waste tire recycling and to transfer knowledge to potential buyers of tire-derived products about proper TDP application, use, and maintenance. Education and training can consist of courses, workshops, videos, teleconferences, and printed materials such as best practices training guides. In contrast, outreach and promotion activities are primarily aimed at building awareness of, and interest in, using tire-derived products.

CalRecycle does not have a distinct education and training program specifically aimed at increasing waste tire diversion. Rather, education and training has been a component of various other programs over the years. Consequently, there are no explicitly stated education and training program goals. However, there have been numerous education and training events and activities undertaken since the waste tire program was initiated.

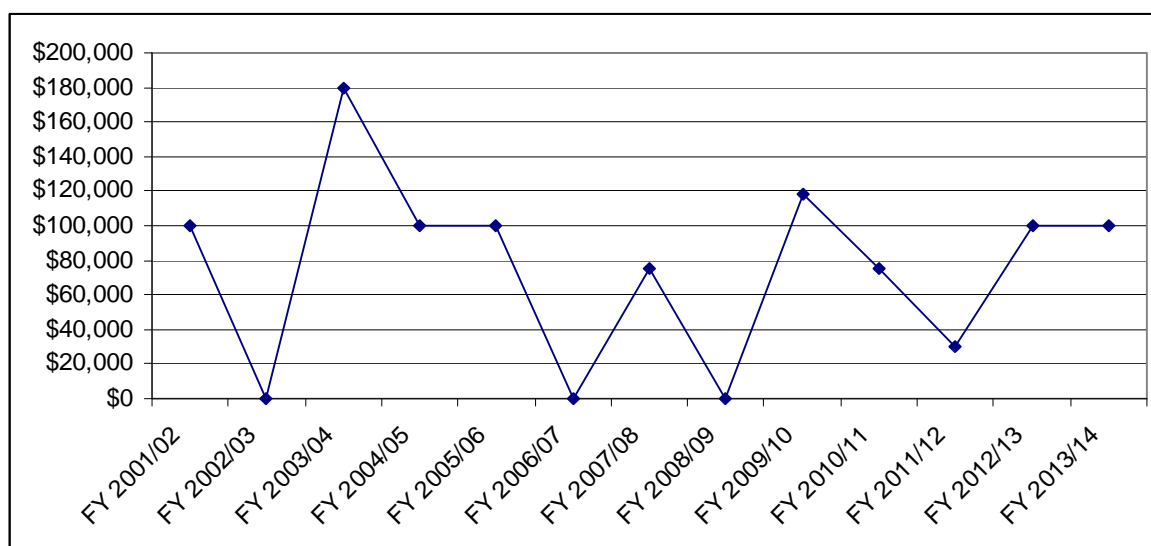
### **TIRE EVENTS**

The “tire events” category included in the Five-Year Plan is assumed to pertain primarily to education and training activities (with outreach and promotion components). CalRecycle provides tire workshops, forums, and/or trainings. These tire business/product events aim to provide attendees with up-to-date information about waste tire management programs and provide a venue to discuss all aspects of waste tire management, including hauling, manifests, cleanup, proper disposal, recycling technologies, and research and market development activities. These events also offer an opportunity for staff, industry representatives, and other stakeholders to meet, develop relationships, and discuss issues of common concern. Tire events are sometimes conducted in conjunction with other related events of organizations such as the League of California Cities, California Public Works Association, or California State Association of Counties.

From 1990 to 1998, approximately \$262,000 was spent on hosting conferences and workshops and developing educational materials such as reports and videos to inform the public, business community, and local government decision-makers about concerns regarding improper disposal of tires and potential uses for waste tires. This cost figure is for consultants and education and training services provided such as workshops and conferences, as well as the cost of facilities and catering at the events. It does not include CalRecycle staff time. It also does not include some related costs such as consultant assistance in developing materials or facilitating sessions, which may be covered under separate CalRecycle contracts.

Figure 4-2 provides a summary of the budget for tire events from FY 2001/02 through 2013/14. These events consisted of workshops, forums, and/or training related to the various waste tire programs under way. The amount allocated to tire events is relatively small, comprising an average of less than 1 percent of the tire-derived product market development budget.

**Figure 4-2. Tire Event Budget – 2001/02 – 2013/14<sup>1</sup>**



<sup>1</sup> As presented in the Five-Year Plans. Budget data for years presented in more than one Five-Year Plan are derived from the more recent plan. Does not include educational components of programs and projects that are considered to use other types of market development mechanisms, primarily.

### **OTHER EDUCATION AND TRAINING**

Other programs and projects also provide education and training opportunities. For example, the TDA Civil Engineering Technical and Construction Management Support Contract provides educational opportunities which were initially geared toward Caltrans, and since 2007 have begun to focus more on local governments, including workshops. Through the RAC technical assistance program, CalRecycle held conferences to promote the benefits and encourage the acceptance of RAC. In addition, the state has two Rubberized Asphalt Concrete Technology Centers that promote the use of crumb rubber from tires in roadway rehabilitation projects by providing education, training, and consultation services to local agencies. RAC and TDA information was presented at several professional workshops for engineers and other personnel working in the civil engineering field. These education activities are not reflected in the above budget but were included in the budgets of specific programs.

TBAP also has an educational component, primarily through its sectorwide grant program. TBAP projects are described in greater detail under Business and Technical Assistance below. However, education and training related activities include workshops on quality control and assurance conducted at the last two CalRecycle annual tire conferences, webinars covering selling product to the green building sector and to government agencies, and a webinar on using construction databases as a sales tool. A tool kit also was developed under TBAP to help marketers and manufacturers of tire-derived products successfully market their products to government agencies. This tool kit was included on the CalRecycle website. A research project was implemented in 2008 and 2009 to develop and implement curriculum and continuing education credits at the university level for engineers and public works officials regarding the use of rubberized asphalt concrete and civil engineering uses for waste tires. Curriculum materials for 10 engineering classes were presented and distributed to engineering educators in the various college and university systems throughout the state, including all California State University campuses. It is, therefore, hopefully being utilized by all of the universities; however the number of working



professionals/engineering students that have been taught the curriculum has not been documented.

## **B. Education and Training Effectiveness and Lessons Learned**

Efforts to track the effectiveness of training and education activities using quantitative measures have included administration of participant questionnaires at the end of training events and documenting whether events were held as budgeted and scheduled. For example, in a recent survey conducted of TBAP participants, 10 respondents (45 percent) said they found the 2010 tire conference to be useful, very useful, or extremely useful, while 27 percent said they found it to be only somewhat or not useful. Six respondents, or 27 percent of the respondents, indicated that they were not familiar with or aware of the conference. In the same survey, nine respondents (41 percent) said they found TBAP training programs to be useful, very useful, or extremely useful, while eight respondents (36 percent) said they found them somewhat or not useful. An additional five respondents (23 percent) indicated that they were not familiar with or aware of the training programs.

From a qualitative standpoint, it appears that education and training regarding RAC has been effective in encouraging local governments to undertake RAC projects. TDA-related education and outreach has contributed to steadily increasing understanding about viable applications by select local agencies and Caltrans engineers who have participated in these sessions. However, these training opportunities could be expanded to reach more people, and especially in areas with known opportunities to benefit from use of TDA. TBAP-related training has been well received, but it appears that many targeted firms are not well aware of TBAP-related training programs and materials.

With respect to other training and education activities, CalRecycle staff and the consulting team have worked toward making training and education events relevant, informative, and convenient. Events have been held both via teleconference and webinar, as well as in locations in Northern and Southern California. The 2010 annual conference was shortened to a one-day event to ease the travel burden and boost attendance.

In general, however, CalRecycle's education and training efforts would benefit from greater coordination and relatively minor additional costs to help promote opportunities and to disseminate information to targeted groups. For example, recycling and solid waste managers could be educated on the types and uses for TDPs in government and green business applications and how they can serve to promote use of TDPs in their own jurisdictions. Training programs and activities should be coordinated and leveraged to ensure that education and training opportunities are being maximized, relative to needs/barriers and resource limitations, and coordinating with other events that would tend to attract the same target audience, as appropriate.

Also, some training and workshop sessions have been sparsely attended by stakeholders, with attendees largely comprised of CalRecycle staff and consultants. There are several reasons that can preclude stakeholders' attendance, including cost of attendance, topics being addressed, location and timing of the event, inadequate outreach, etc. Querying all stakeholders periodically (not just event attendees) can help shape future education and training sessions to be as relevant and well-attended as possible.

### **C. Use of Education and Training to Address Current and Future Barriers and Opportunities**

Key remaining market development barriers that could be addressed through training and education exist. While some activities have been undertaken to address these barriers, there is an opportunity to place further emphasis on doing so. In fact, Program Evaluation Advisory Committee members expressed that there is a need to place much greater emphasis on training and education particularly with respect to educating potential end users on product performance and life-cycle costs and benefits.

Provided in the table below is a list of key education and training related barriers, current training and educational activities and additional programmatic options to consider in addressing remaining barriers.

**Table 4-8. Education/Training Barriers, Current Activities, and Programmatic Options to Consider**

Education/Training Barriers	Current Education/Training Activities	Programmatic Options to Consider
<p><b>1. Environment/Health Concerns</b></p> <p>Some customers are concerned about human and environmental health issues raised in the media, and there is a lack of readily available, credible and easy-to-understand documentation addressing the issue. This can impact feedstock conversion and new product development.</p>	<ul style="list-style-type: none"> <li>• Literature review of and links to existing health risk studies.</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain an up-to-date list of web links to studies on health impacts.</li> <li>• Provide guidance on how to minimize risks via proper product application and use.</li> <li>• Train TDP producers on how to address questions from the media and public about health and environmental concerns.</li> </ul>
<p><b>2. Lack of Knowledge about Best Management Practices.</b></p> <p>There is a lack of knowledge among producers, users and installers of tire-derived products regarding operational efficiencies, and about ways in which potential health, safety, and environmental impacts could be mitigated through installation, use, or maintenance practices.</p>	<ul style="list-style-type: none"> <li>• Provide training sessions on quality control and process improvement.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide workshops for athletic and recreational surfacing installers, users and entities involved in maintenance activities, and/or training video that show how to mitigate potential health and environmental impacts.</li> </ul>

Education/Training Barriers	Current Education/Training Activities	Programmatic Options to Consider
<p><b>3. Lack of Knowledge Regarding Product Applications, Benefits, and Performance.</b></p> <p>Where there is a lack of understanding about the performance and benefits, some customers are skeptical about tire-derived product performance or price. This can hinder not only demand for existing products, but feedstock conversion and new product development.</p>	<ul style="list-style-type: none"> <li>• Case studies including descriptions product benefits were developed as part of a TBAP sectorwide project about marketing TDPs to the green building sector.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop and disseminate life-cycle cost information factoring in rise in conventional material costs, alternative designs, noise abatement, and environmental benefits, etc., using DOT cost data updated with latest performance and cost numbers.</li> <li>• Provide a workshop for landscapers and landscape architects on life-cycle costs and beneficial use.</li> <li>• Provide workshops for specifications developers and purchasing decision-makers.</li> <li>• Develop online cost estimate calculators to estimate life-cycle cost savings for specific products, with variable assumptions allowable.</li> </ul>
<p><b>4. Lack of Adequate Marketing Knowledge.</b></p> <p>Many producers of tire-derived products lack adequate information to effectively identify their target markets and develop successful marketing strategies to reach them.</p>	<ul style="list-style-type: none"> <li>• Develop and provide educational guides, and workshops on marketing to government and green building sectors.</li> </ul>	<ul style="list-style-type: none"> <li>• Create and execute TDP marketing plans for additional market sectors that need marketing guidance.</li> <li>• Develop and provide educational guides, and workshops on marketing techniques for targeting other specific market sectors as well as use of marketing tools such as websites and social marketing forums.</li> </ul>

## **D. Education and Training—Implementation Issues and Considerations**

Following are some key issues and implementation considerations associated with implementing education and training activities:

**Education and training needs greater emphasis on coordination and promotion of opportunities.** Education and training is an effective mechanism for overcoming knowledge and skill-related barriers, which are prevalent among potential users of TDPs as well as TDP processors and manufacturers. However, the state's approach to education and training is currently fragmented. It would be beneficial to create an education and training program that serves to coordinate all education and training activities to ensure they are well-focused, well-planned, well-integrated, and well-promoted.

**Evaluation results related to education and training activities should be centrally compiled.** Survey results from education and training efforts should be tabulated, particularly regarding attendance, topic, suggestions for future topics, and other feedback solicited on attendee surveys. CalRecycle would likely benefit from annually tracking the education and training events conducted, topics addressed, program/activity expenditures, attendance level (broken out by type of attendee—consultant, private industry, public stakeholder, CalRecycle employee, etc.). This would allow for better long-term planning and assessment of (as well as adjustments to) education and training programs and activities. Survey measures such as these will help determine stakeholder satisfaction with education and training events, and will help to identify appropriate topics to be the focus of future education and training efforts; however these evaluation mechanisms are not highly effective at measuring the impacts of education and training on waste tire diversion.

**Data and information provided in educational forums needs to be defensible and objective.** Information presented in educational forums and materials must be perceived as highly credible. For example, in relation to life-cycle cost information, some manufacturers/ installers have developed estimates of cost savings due to the use of tire-derived products as part of their marketing materials. This information may be perceived as being biased, due to the source. Having an objective third-party develop case studies or calculators based on case studies from actual product users may be more defensible. CalRecycle is already careful to ensure that only objective, independent analyses are used to provide educational information on key topics. The organization could consider tapping widely recognized individuals to deliver key training and education information, depending on the targeted audience.

**Some educational activities may present liability issues.** The development of best management practices to help mitigate health and environmental impacts would have to be conducted and disseminated in such a way as to ensure that CalRecycle is not taking on undue risk or liability. This educational material should be developed using defensible research, and utilize appropriate legal language.

**Potential attendees may lack resources to attend education and training sessions.** Training sessions and workshops conducted at a central location are beneficial as they provide both educational and networking benefits, yet some businesses and local governments lack sufficient resources to pay for travel and expenses. CalRecycle has long allowed participation in many public Tires Interested Parties meetings via teleconference or Internet videocast, and has recently begun using webinars. Additional educational opportunities include videotaping discussions, presentations, demonstrations and other useful information and posting on the CalRecycle

website and through such media as YouTube. As new media and Internet communication systems continue to take shape, additional opportunities will continue to surface and evolve.

**Education and outreach topics and methods should be selected in a structured way.** While the education and training sessions that have been presented to date appear to have been appropriate in terms of topics, it would be beneficial for CalRecycle to track the types of education and training activities that have been made available to stakeholders over time, including attendance data and feedback, such that education gaps and potential improvements can be identified. Similarly, suggestions by stakeholders should be tracked in a systematic way.

## **Research and Development**

### **A. Overview of Research and Development**

State staff have conducted and commissioned research projects over the years to help overcome informational and technical barriers to diverting additional waste tires, to expand markets for tire-derived products and to identify new uses/products for tire-derived products. Research as a market development mechanism, in this report, is considered to include efforts that involve developing new information to help an entire industry or market group, as opposed to expanding or developing information to assist a single company or project (which would generally fall under the category of technical assistance). Research-related objectives in the Fifth Edition of the Five-Year Plan include:

- Work with other state agencies, academia and research and testing laboratories to ensure that engineering curricula contain a wide range of tire-derived product applications;
- Conduct research and establish programs that support and promote new technology, new uses for waste tires, and improvements to products that use California-generated waste tires; and
- Identify research gaps in existing data and determine what areas need further investigations.

### **MARKET DEVELOPMENT RESEARCH PROJECTS CONDUCTED UNDER THE TIRE RESEARCH PROGRAM**

In the Five-Year Plan, “Research” is a separate section apart from “Market Development.” Some research topics included in the Five-Year Plan have addressed market development issues, while other research topics have not. Currently only one project listed in the Five-Year Plan is not market development-related. This is a research project addressing minimum energy standards for replacement tires, which is budgeted at \$150,000 per year for FY 2009/10 and 2010/11. Some recent CalRecycle market development research projects identify or evaluate potential new uses for waste tires, while others have been directed at filling specific information gaps. Other research efforts conducted by state staff and contractors have sought to more fully understand the state of the waste tire marketplace in California. Lastly, some research efforts were directed at specifically evaluating market development programs. Table 4-9 summarizes the research projects that have been undertaken in each of these categories, starting with the most recent.

**Table 4-9. Summary of Research Reports Undertaken to Enhance Waste tire Market Development**

Potential New Uses for Waste Tires	Filling Market-Specific Information Gaps	Research About California's Waste tire Marketplace and Market Development Programs
<ul style="list-style-type: none"> <li>• Feedstock Conversion, 2009</li> <li>• TDA as a Component in Slurry Cutoff Walls, 2006</li> <li>• Analysis of Pyrolysis, Gasification and Liquefaction, 2006</li> <li>• Devulcanization Strategies, 2004</li> <li>• Building Products Made with Recycled Tires, 2004</li> <li>• Increasing the Recycled Content of Tires, 2004</li> <li>• Markets for Fiber and Steel, 2003</li> <li>• New Uses for Old Tires – Public Works, 2002</li> <li>• Civil Engineering, 1999</li> <li>• Tire Shreds as Final Cover Foundation Layer at Landfills, 1998*</li> <li>• Tire Shreds as Gas Collection Material at Landfills, 1998*</li> <li>• Tire Shreds as Gas Collection Material at Landfills, 1998*</li> <li>• Tire Shreds as Leachate Drainage Material at Landfills, 1998*</li> <li>• Tire Shreds as Operations Layer at Landfills, 1998*</li> <li>• Shredded Tires as ADC at Landfills, 1997*</li> <li>• Tires as a Fuel Supplement, 1992</li> </ul>	<ul style="list-style-type: none"> <li>• Tire-Derived Resilient Flooring Study, in progress</li> <li>• Evaluation of Health and Safety Impacts of Artificial Turf, in progress</li> <li>• Literature Review, Health and Environmental Impacts of Tire-Derived Products, 2009</li> <li>• Evaluation of Health Effects of Waste Tires in Playground and Track Products, 2007</li> <li>• Building Material Emissions Study, 2003</li> <li>• Evaluation of Employee Health Risks from Open Tire Burning, 1997</li> <li>• Pollutant Test of TDF at Cogen Facility, 1997</li> <li>• Effects of Waste Tires, Waste Tire Facilities, and Waste Tire Products on the Environment, 1996</li> <li>• Environmental Impacts of Pyrolysis, Gasification and Liquefaction, 1995</li> </ul>	<ul style="list-style-type: none"> <li>• Investigation of Select Other States' Tire Market Development Programs, 2009</li> <li>• Market Penetration Analysis, 2009</li> <li>• The Flow of Waste Tires in the Mexico-California Border Region, August 2009</li> <li>• 2008 California Scrap Tire Market Report, May 2009</li> <li>• California Waste Tire Markets: Annual Reports (1994, 1995, and 1999 - 2006)</li> </ul>

\* Denotes Guidance Manual that provides education as well as research results.

As markets for waste tires evolved throughout the 1990s and early 2000s, the focus of research efforts has shifted accordingly. Initial research emphasized the use of tire shreds in relatively low-technology applications, such as tire shreds for use in landfill applications, and using tires as a fuel source. (Statutorily, however, the state is no longer allowed to fund projects that promote tire-derived fuel.)

Some recent research efforts have emphasized more fully developing uses for TDA through civil engineering applications, particularly in applications where TDA can provide valuable engineering properties at a reasonable cost (such as lightweight fill in retaining walls and sound barriers). Building on the engineering benefits of TDA will increase the likelihood of TDA being an economically feasible choice for civil engineering projects.

Additional research has focused on expanding the types of use of crumb rubber in paving applications, as well as in feedstock conversion. CalRecycle, for example, has been working to develop additional paving products that use crumb rubber (e.g., warm blend and terminal blend), which could expand the markets for RAC to colder climates, smaller projects, and to more remote locations). It is hoped that if the market for terminal blend is expanded, it will encourage more opportunities for fine-ground rubber, which will further enhance the likelihood of crumb rubber being used in more manufacturing applications (e.g., feedstock conversion).

In 2004 and 2006 research efforts included study of emerging technologies/markets such as pyrolysis, gasification, and liquefaction.

Informational gaps being addressed through research efforts throughout the entire program have included a strong focus on obtaining information about health and environmental impacts of scrap-tire uses – from using waste tires as fuel in the 1990s to the use of waste tires in manufacturing artificial turf, playground materials, and indoor flooring products.

Current and planned future research projects include:

- Continuing to examine the potential health and environmental impacts of artificial turf and tire-derived playground products;
- Developing conceptual designs and conducting field tests to validate a new retaining wall design (research/technical assistance);
- Continuing to research and promote civil engineering applications at landfills (e.g., in layers containing landfill gas and leachate collection systems); and
- Continuing to research and evaluate additional rubberized asphalt products such as terminal blend rubberized asphalts and warm mix asphalt and their feasibility and benefits.

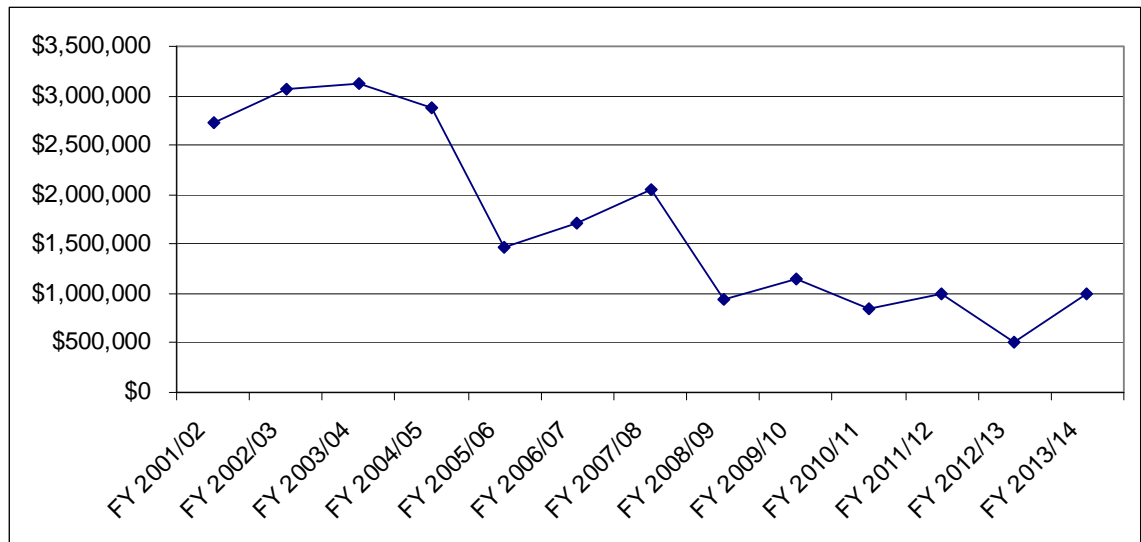
In the past, individual staff and stakeholders have been invited to suggest topics for specific research projects. Potential research project ideas also naturally arise from previous projects and through public meetings. In general, ideas are vetted by CalRecycle management and proposed with budgets in the Five-Year Plan. Because several public meetings are held during the development phase of the Five-Year Plan, proposed research topics could change significantly during the process.

Funding allocated for research has declined over time, as Figure 4-3 indicates. Note that the data in Figure 4-3 pertain to actual budget allocated to “research activities” in the Five-Year Plans. This does not correlate exactly with research mechanisms as defined in this report, however the trend is reflective of the budget allocated to use of research as a market development mechanism



over time. The downward trend is consistent with the concurrent market trend towards a range of diverse, commercially proven uses for waste tires, in which research played a key role early in the process, but then gave way to technical and funding assistance, and finally to promoting the use of the tire-derived product with reduced funding assistance.

**Figure 4-3. Budget Allocated to Market Development Research— FY 2001/02–FY 2013/14<sup>1</sup>**



<sup>1</sup> As presented in the Five-Year Plans under "Research" excluding non market-development research. Budget data for years presented in more than one plan are derived from the more recent plan. Does not include educational components of programs and projects that are considered to use other types of market development mechanisms, primarily

Table 4-10 shows the budget allocated for research (as defined in this report) for FY 2009/10 through 2013/14, and the portion of the market development budget this comprises.

**Table 4-10. Budget for Tire Market Development Research – 2009/10 – 2013/14<sup>1</sup>**

	FY 2009/10	FY 2010/11	FY 2011/12	FY 2012/13	FY 2013/14
CE Applications for Waste Tires	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000
Research on Highway Construction Applications Using Waste Tires	\$500,000	\$0	\$500,000	\$0	\$500,000
Artificial Turf Study		\$200,000			
<b>Subtotal</b>	<b>\$1,000,000</b>	<b>\$700,000</b>	<b>\$1,000,000</b>	<b>\$500,000</b>	<b>\$1,000,000</b>
Percentage of Total Market Development Budget	4.6%	3.2%	4.5%	3.7%	7.4%

<sup>1</sup> Budgets as presented in the Fifth Edition Five-Year Plan for "Research" excluding the research project titled "Minimum Energy Efficiency Standard for Replacement Tire Analysis," which is not a market development study. Market development budget is adjusted to exclude broad programs that are not deemed to be market development programs.

As Table 4-10 indicates, research efforts (excluding technical assistance and research items that are not market-development related) range from 3.2 to 7.4 percent of the market development budget for the years indicated.

## **RESEARCH CONDUCTED UNDER OTHER PROGRAMS**

### ***TBAP Sectorwide Research Projects***

The TBAP program and associated sectorwide projects are described in detail under Technical and Business Assistance below. However, we cover related research projects briefly here. Research projects conducted through TBAP have mainly focused on expanding the amount and type of market information available. In May 2009 a new format for annual Waste Tire Market Reports was published (covering the years 2007 and 2008), along with a new protocol for researching and analyzing data. The report format continued the previous Waste Tire Market Reports prepared by staff, while making adjustments to provide greater detail in reported results. Under the current TBAP contract, two additional annual market studies for 2009 and 2010 will be prepared. While the first report included preparation of a protocol with templates, to date TBAP contractors take the lead on preparing these reports.

The market penetration project is going beyond the annual market flow reports to provide estimates of maximum market size, current penetration, and analysis of reasonable targets, by market segment. The report is being undertaken as part of this Program Evaluation project.

Another TBAP research project evaluated the potential opportunities related to feedstock conversion (established manufacturers switch to using ground rubber from other non-recycled tire rubber feedstocks). Research for the report helped to identify candidates for Cycle 3 of TBAP, with a small number ultimately receiving approved service agreements. The report provided a rough estimate for ultimate demand in this arena (52 million pounds per year of ground rubber), although the number could be much higher as firms become familiar with the raw material aspects of SBR rubber and experiment with established and new product formulations.

## **B. Research and Development Effectiveness and Lessons Learned**

It is challenging to measure effectiveness of research, due to the time lag between research and implementation, and also the fact that some research is not intended to directly lead to expanded diversion (e.g., market studies) but rather indirectly do by assisting the state and private firms to identify opportunities. Notwithstanding these challenges, it appears that the research that has been performed in California at least in part has helped CalRecycle progress in expanding markets.

Qualitatively, it appears that research efforts have helped enhance tire-derived product markets over time in the following ways:

- State research appears to have played a role in the rise of the TDF market (in the early years of the program);
- State research helped demonstrate RAC costs and performance benefits and thereby paved the way for the adoption of the current Caltrans RAC use mandate which led to significant growth in that application;
- State research on tire-derived aggregate in landfill applications helped establish that use as a significant potential market, and research on transportation related lightweight fill applications has opened the door for several additional TDA uses;

- Research has provided information and studies about potential health and environmental risks associated with tire-derived playground and athletic products, currently a major growth barrier and potential threat to these established markets;
- Research (along with technical assistance and education and training efforts) has helped address technical and informational barriers associated with the use of TDA in landfill and non-landfill applications; and
- CalRecycle market studies provide the only available estimates of overall uses of California waste tires and market trends.

These research efforts would likely not have been completed without state assistance. Such studies are generally too costly for individual businesses to conduct. Although some national industry-related organizations and agencies in other states have taken on such studies, they may not be perceived as objective or relevant to the California context by some parties.

In many instances CalRecycle is leveraging external programs and resources, such as:

- Consultants that have expertise in market development, technical areas, or business;
- University departments, such as the Institute for Regional Studies at San Diego State University; California State University, Chico; and the University of California, Davis; and
- Other state departments and agencies, such as the Office of Environmental Health Hazard Assessment, Caltrans, and the Board of Equalization.

In addition, research conducted to date has helped CalRecycle to more effectively evaluate proposed projects for new technologies.

In some cases it appears that research projects have lacked adequate follow-through to promote the application of research results. For example, the study regarding markets for fiber and steel (2003) presented good information and potential markets for fiber and steel, as well as for “new uses for old tires” in the public works arena, but it does not appear that CalRecycle has encouraged these new markets or worked with public works officials to further markets for steel and fiber from tires. Also, research results from some projects could be better packaged and disseminated to provide education and/or outreach to other audiences.

CalRecycle could leverage its funding programs better by requiring grantees to provide “hard data” on cost and performance, at least in some cases, to support overall analysis and case studies for use in outreach and education activities.

CalRecycle has not yet realized the Five-Year Plan market-related research performance measure to “Develop in-house capabilities to track the market for various tire-derived products on an ongoing basis.”

### **C. Use of Research and Development Mechanisms to Address Current and Future Barriers and Opportunities**

Research activities can help potential consumers of tire-derived products become more comfortable with their performance and product benefits, and life-cycle cost benefits to promote their use. Research efforts can also help product manufacturers identify opportunities to substitute crumb rubber in their manufacturing processes, thus expanding crumb rubber markets. Table 4-11

summarizes barriers that can be addressed through research, as well as ongoing and recent research efforts and new research options for CalRecycle's consideration.

**Table 4-11. Research and Development Barriers , Current Activities, and Options to Consider**

Research and Development Barriers	Current Activities	Programmatic Options to Consider
<p><b>1. Lack of Information about Life-Cycle Cost Benefits and Other Benefits of Tire-Derived Products.</b></p> <p>While some users of tire-derived products can anecdotally describe product benefits and maintenance costs saved over the life of their product, a more in-depth research project regarding the life-cycle cost benefits of tire-derived products as well as performance benefits could help convince some communities to try the products, and help them justify higher up-front costs.</p>	<ul style="list-style-type: none"> <li>• Case studies describing product benefits were developed as part of the green building TBAP sectorwide project.</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct research regarding life-cycle cost and performance benefits of ground rubber products, with an emphasis on feedstock conversion applications.</li> <li>• Leverage information from grantees as possible by requiring them to provide hard data on cost and performance and to participate in case study documentation.</li> </ul>
<p><b>2. Lack of Knowledge about Emerging Products, Product Use, and/or Ability to Manufacture with Crumb Rubber.</b></p> <p>Research is still needed to develop/perfect new uses for TDA in civil engineering applications, and to develop/perfect new RAC products such that the user base and application base can be expanded, thus expanding the marketplace. Also, more research could be conducted to better understand how ground rubber can be used as a feedstock in manufacturing products (e.g., feedstock conversion).</p>	<ul style="list-style-type: none"> <li>• Current research includes civil engineering uses for TDA and additional RAC products.</li> <li>• Feedstock conversion study.</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct additional research to identify feedstock conversion opportunities.</li> <li>• Continue research (along with education and outreach) regarding uses of TDA in unproven CE applications such as residential septic drainage, waster quality applications and landfill operational layers/leachate collection applications.</li> <li>• Conduct research to identify potentially new products and applications for waste tires.</li> <li>• Periodically update research analyzing the current state of emerging technologies such as gasification, pyrolysis and devulcanization.</li> </ul>

Research and Development Barriers	Current Activities	Programmatic Options to Consider
<p><b>3. Health/Environmental Concerns.</b> Studies investigating the potential health and environmental impacts of tire-derived products are still under way. These concerns appear to have had an impact on reducing demand in some cases, and represent a potentially serious threat to these established markets.</p>	<ul style="list-style-type: none"> <li>• Identify/make available other studies conducted regarding health/environmental impacts.</li> <li>• OEHHA ongoing research studies regarding health/environmental impacts of athletic turf fields and indoor Reference Exposure Levels (iRELs) to chemicals from indoor flooring.</li> </ul>	<ul style="list-style-type: none"> <li>• Continue to study issues as needed and expand coordination with outreach and promotion program activities to better disseminate findings.</li> <li>• Research and/or identify/make available other studies on Best Management Practices that can mitigate health/environmental impacts.</li> <li>• Provide tools for comparing the net life-cycle GHG emissions and other environmental attributes of TDPs compared to alternative, competing products.</li> </ul>
<p><b>4. Lack of Information about Emerging Technologies/Products.</b> Identifying potential new products and applications for waste tires may prove essential to maintaining a robust, diverse marketplace in the future. Some analysts suggest that TDPs tend to follow a rise-and-fall trajectory that implies today's established uses may peak, then gradually decline. Opportunities related to rubber-plastic compounds may have particular potential. Additionally, emerging technologies such as pyrolysis, devulcanization, and gasification are still not proven to be commercially viable, however the "state of the art" and commercial viability is a constantly moving target and CalRecycle receives regular inquiries from developers seeking to establish facilities. Periodic research would ensure that CalRecycle is prepared to respond as project developers seek state support.</p>	<ul style="list-style-type: none"> <li>• Work with universities to conduct research into new technologies and products.</li> <li>• Feedstock conversion study conducted under sectorwide TBAP project.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide grants for basic research to identify and test potential new uses for waste tires.</li> <li>• Research feedstock conversion, especially rubber-plastic compounds, to document potential uses for ground rubber in established products.</li> <li>• Increase coordination of research findings with outreach and promotion activities to better promote technology transfer and commercialization of new opportunities.</li> </ul>

Research and Development Barriers	Current Activities	Programmatic Options to Consider
<p><b>5. Concern over the End-of-Life Management of TDPs.</b></p> <p>CalRecycle may want to more fully evaluate and identify potential means to recycle tire-derived products as they reach the end of their useful life. Potential buyers may be more likely to purchase products they know can be recycled at the end of their useful life.</p>	<ul style="list-style-type: none"> <li>Researching recyclability of RAC with the City of Thousand Oaks.</li> </ul>	<ul style="list-style-type: none"> <li>Work with Caltrans, universities, and local governments to research the recyclability of other TDPs.</li> </ul>
<p><b>6. Lack of Information about Greenhouse Gas Emissions and Climate Change Implications.</b></p> <p>California's Global Warming Solutions Act of 2006 (AB 32) has helped to generate interest in measuring carbon footprints associated with company operations and products, and could provide opportunities to help promote certain tire-derived products.</p>	<ul style="list-style-type: none"> <li>Researching carbon footprint of specific TDP manufacturers through a sectorwide TBAP project.</li> </ul>	<ul style="list-style-type: none"> <li>Research life-cycle net carbon benefits of tire-derived products relative to non tire-derived products.</li> </ul>

#### **D. Research and Development – Implementation Issues and Considerations**

Following are several issues related to research and development as a market development mechanism, along with some implementation options for CalRecycle consideration:

**It is difficult to isolate research impacts.** When a study is completed, it is difficult to know the extent to which the research is successful in mitigating specific market barriers. In the section on Planning and Performance Measurements, tracking of market barriers and changes in the extent to which they are at play is recommended. Also, there is an unavoidable time lag between when research is conducted and when an activity using waste tires results (whether it be manufacturing, stimulating demand, or using some other type of technology).

**Research priorities are not systematically established.** Although it appears that the research topics pursued by CalRecycle have generally been relevant to tire market development, the planning process does not appear to be systematic from the standpoint of identifying and prioritizing market barriers that could be addressed through research. A systematic process involving a public discussion about existing market barriers and market development priorities could help ensure that pertinent research projects ensue.

**Close coordination is required for research results to be appropriately packaged and disseminated.** When research efforts are conducted, they are generally discussed at interested parties meetings, conferences, and trade shows. Also, any resulting reports are typically made available on CalRecycle's website. However, frequently research outcomes could be disseminated more effectively, in a manner that reaches the potential consumers, rather than just those involved in the industry or those who happen to be following the research project. This is described more fully in the description of the education/outreach mechanism. In addition, some research may need to be supplemented with technical assistance, as well as funding, to effectively result in expanded markets. For example, some research efforts may provide information that, with some technical assistance, could be the basis for a best management practices guide, which would make the research results more meaningful and actionable for stakeholders. In some cases other types of follow-up may be helpful to identify next steps, if feasible, such as surveys or forums at workshops.

### ***Business and Technical Assistance***

#### **A. Overview of Business and Technical Assistance Mechanisms**

The business and technical assistance market development mechanism is aimed at addressing barriers related to a specific organization's growth, operational vitality or technical barriers related to specific waste tire products or applications. Business and technical assistance mechanisms can assist companies that produce rubber feedstocks and that produce, install, or market TDPs to grow their businesses and employ the best business and operational practices, or can provide technical assistance to local agencies and other groups to assist them with evaluating and implementing projects that use TDPs, tire-derived aggregate, or other waste tire applications. The mechanism often employs hands-on experts or multidisciplinary teams who work with targeted organizations, product testing services to evaluate product performance, and/or the application of established tools such as Six Sigma manufacturing strategies.



Business and technical assistance is effective when the goal is to help organizations institutionalize adjustments to “business as usual.” Business and technical assistance complements education and training, which aims to develop skills and knowledge, usually across several firms or organizations simultaneously rather than a specific organization. And, business and technical assistance differs from outreach and promotion, which is aimed at building awareness and creating behavior change on the part of individuals rather than solving the specific, unique challenges of a particular organization. Especially when combined effectively with funding programs, business and technical assistance can provide a powerful incentive to organizations to try a new product or approach.

CalRecycle business and technical assistance activities to date have included the following programs, all of which are still in operation:

- TDA Civil Engineering Technical and Construction Management Support;
- RAC Technology Centers;
- RAC Technical Assistance Contract; and
- Tire-Derived Product Business Assistance Program (TBAP) Business Assistance Grants.

In addition to these waste tire specific programs operated by CalRecycle, two other business and technical assistance programs lend support for waste tire market development. Through the Recycling Market Development Zone (RMDZ) program, CalRecycle staff and local administrators of 40 established zones provide a range of business assistance services. And, California Business Investment Services (CalBis) offers a network of regional and local resources to assist in site selection for new facilities and to meet other business needs. CalRecycle tire program staff regularly coordinates with CalBis to help screen prospective tire market development ventures and determine the best way to assist them.

Table 4-12 shows the budget allocated to CalRecycle’s four waste tire business and technical assistance programs for the 2008/09-2013/14 time period. These programs are described following the table.

**Table 4-12. Technical Assistance Budget for 2009/10-2013/14<sup>1</sup>**

<b>Technical Assistance Program</b>	<b>FY 2009/10</b>	<b>FY 2010/11</b>	<b>FY 2011/12</b>	<b>FY 2012/13</b>	<b>FY 2013/14</b>	<b>Five-Year Total</b>
TDA Civil Engineering Technical and Construction Management Contract	\$3,250,000	\$1,000,000	\$2,750,000	\$1,361,334	\$1,711,334	\$10,072,668
RAC Technology Centers	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$500,000
RAC Technical Assistance Contract	\$1,325,000	\$1,325,000	\$1,325,000	\$500,000	\$500,000	\$4,975,000
Tire-Derived Product Business Assistance Program (TBAP) <sup>2</sup>	\$0	\$2,500,000	\$674,334	\$2,000,000	\$2,500,000	\$7,674,334
<b>Total</b>	<b>\$4,675,000</b>	<b>\$4,925,000</b>	<b>\$4,849,334</b>	<b>\$3,961,334</b>	<b>\$4,811,334</b>	<b>\$23,222,002</b>
<b>Percentage of Total Tire Market Development Budget<sup>3</sup></b>	20.9%	22.5%	21.9%	29.2%	35.8%	24.8%

<sup>1</sup> As project budgets are presented in the Fifth Edition Five-Year Plan, May 2009.

<sup>2</sup> TBAP budget figures include business assistance, sectorwide projects and other authorized funding for contract related activities requested by CalRecycle.

<sup>3</sup> In this report the tire market development budget includes both "market development" and "research" as defined in the Five-Year Plans.

### **TDA CIVIL ENGINEERING TECHNICAL ASSISTANCE CONTRACT**

CalRecycle has contracted with engineering firms to provide technical assistance and construction management services for TDA projects since 2001/02. The current contract is with Kennec, Inc. The contract provides CalRecycle with expert consultants with a broad range of engineering experience applicable to promoting TDA in civil engineering projects at multiple levels. Contract activities mainly involve providing technical assistance to project sponsors at Caltrans and local agencies, potentially including all aspects of project development and execution such as evaluating the costs and potential performance characteristics of TDA, assisting with execution, securing TDA supplies, and documenting results. The contract also has included: education and training activities such as workshops and presentations, and development of guidance manuals; and outreach and promotion activities such as development of a video, brochure, and presentations to local agencies. When the contract is used to identify and evaluate potential applications that have not been previously tried, it also involves a research component.

The TDA Civil Engineering contract is funded at a level of \$3.25 million in 2009/10, \$1 million in 2010/11, \$2.75 million in 2011/12, and \$1.7 million in 2013/14, which is an average of \$2 million per year or 10.8 percent of the total market development budget. In the mid 2000s contract allocations were as high as \$2.5 to \$3.5 million, although prior to 2005/06 \$500,000 was allocated.

### **RAC TECHNOLOGY CENTERS**

The RAC Technology Centers provide technical assistance to local governments through direct consultation and presentations at local and regional workshops. One technology center is operated by Los Angeles County (funded initially in FY 1997/98) and one is operated by Sacramento County (established in 2000). Technology centers primarily provide technical assistance, but also provide education and training as well as outreach and promotion services. In essence, the county liaisons serve as champions of RAC, and make time available to share their expertise with other local governments who may be less familiar with RAC. The centers submit quarterly reports to the program manager describing services provided during that quarter. Since 2007/08 the centers have been budgeted at \$100,000 annually, a decrease from \$250,000 allocated annually in the early to mid-2000s.

### **RAC TECHNICAL ASSISTANCE CONTRACT**

CalRecycle has utilized a RAC Technical Assistance Contract since the early 2000s (the current contractor is Jacobs Engineering). The contract provides technical support for the use of RAC by local agencies and to help CalRecycle staff generally develop and implement RAC assistance strategies. This technical support addresses issues associated with roadway projects, including rubber hot-mix, rubber chip seal, rubber cape seals, and other emerging paving applications that use tire-derived materials that have been determined by CalRecycle to have benefits derived from the use of recycled tires. The technical assistance contractor also serves as the liaison at various stakeholder workshops and conferences that promote RAC programs. Therefore, while the contract focuses on technical assistance, it also helps address some education/training barriers as well as outreach/promotion. The current contract is budgeted for \$1.325 million annually from FY 2008/09-2011/12 and \$500,000 per year for FY 2012/13 and 2013/14, which is an average of \$995,000 per year, or 5.3 percent of the market development budget.

### **TIRE-DERIVED PRODUCT BUSINESS ASSISTANCE PROGRAM (TBAP)**

An innovative program launched by CalRecycle in March 2006, the TBAP program has two distinct elements: business assistance grants and sectorwide projects.

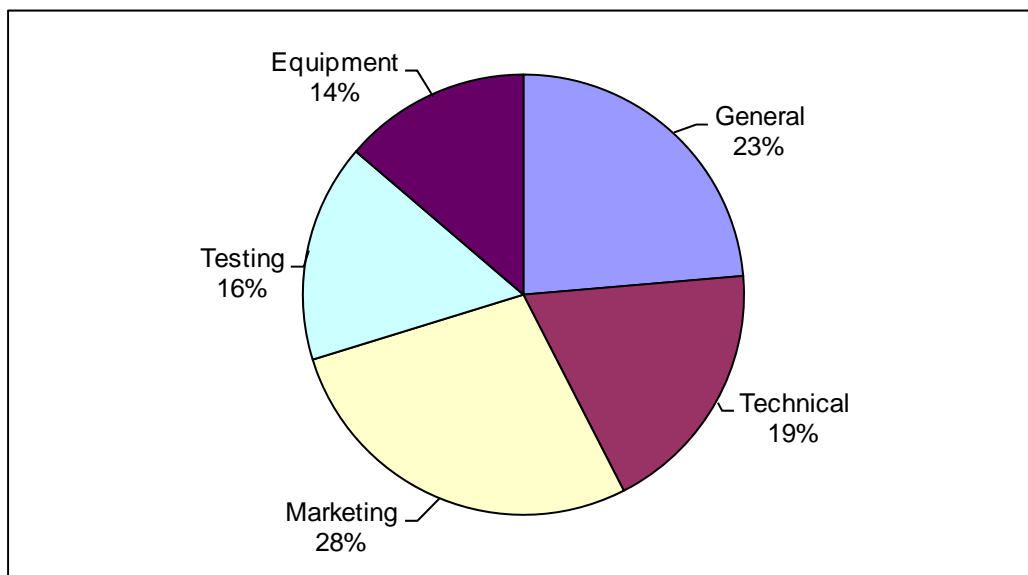
TBAP business assistance grants aim to strengthen the profitability and business performance of waste tire processors and TDP producers, installers and marketers, and to increase and diversify markets for TDPs. Ultimately the program seeks to ensure that firms in the TDP supply chain are self-sufficient and independently viable. TBAP business assistance grants were conceived in part to replace the former Tire Commercialization and Technology Grant Program as a means of more broadly strengthening the TDP supply chain. Under TBAP, applicants submit a package detailing their requested use of services, along with detailed business and financial information. In coordination with CalRecycle staff, the TBAP contractor provides an independent assessment of each applicant's needs, which serves as the basis for developing an assistance action plan.

Applicants can qualify for up to \$50,000 or \$175,000 worth of assistance services, depending on a number of factors. Small and start-up firms qualify at a rate of \$1.50 per PTE based on throughput in the previous year, up to a maximum of \$50,000. Custom manufacturers and non-production firms that install or market TDPs qualify at a rate of \$0.75 per PTE based on throughput in the previous year, up to a maximum of \$50,000. Existing firms qualify at a rate of \$0.50 per PTE, up to a maximum of \$175,000. And, expanding and feedstock conversion firms (interested in switching to tire rubber feedstock) qualify at a rate of \$5.00 per tire, up to a maximum of \$175,000.

Assistance services are provided by a multi-disciplinary contractor team and may include technical assistance (e.g., increasing operational efficiency), marketing assistance (e.g., website and collateral design and product, or market strategy development), general business assistance (e.g., business strategy development or refined performance measurement systems) or product testing assistance (e.g., documenting product performance in relation to established standards). In the first two program cycles, applicants were eligible to use a portion of grant funds for equipment purchases that were determined to meet priority needs. As of the third program cycle, equipment purchases are no longer allowed. However, CalRecycle has launched a new tire loan program to provide funding support to firms in need of capital equipment.

Through the three TBAP program cycles conducted to date, 39 firms have received approved assistance packages valued at \$6.04 million. Of these, 15 firms received two assistance grants, and three firms received only equipment grants. Three firms withdrew from the program before receiving services. Figure 4-1 shows the breakdown of funds approved for these firms.

**Figure 4-4. Summary of TBAP Assistance Grant Funds by Assistance Type**  
**Total = \$6.04 Million**



The second TBAP program element involves “sectorwide” projects that aim to benefit one or more industry sectors (as opposed to one-on-one assistance to a particular firm), or to help support CalRecycle’s waste tire market development programs. Table 4-12 below describes the sectorwide projects that have been conducted, or are under way.

**Table 4-12. TBAP Sectorwide Projects**

<b>Project</b>	<b>Description</b>	<b>Budget</b>
<b>TBAP Contract #1 – Completed in May 2009</b>		
Feedstock Conversion	Research—Evaluated the potential for expanding demand for ground rubber in established manufacturers and products.	\$150,000
Construction Database Pilot Project	Outreach and Promotion/Education and Training—Evaluated and tested a range of construction industry databases, conducted two training sessions; provided recommendations for future CalRecycle outreach projects	\$75,000
Supply and Demand Inventory	Research—Identified and evaluated CalRecycle data sources; developed initial market data and an approach to more detailed annual market analyses.	\$25,000
Government & Green Building Sales Support	Outreach & Promotion/Education and Training—Evaluated opportunities for outreach to customers in the green building and government purchasing arenas. Developed and conducted two training sessions on government and green building sales. Prepared a tool kit to assist in marketing and selling TDPs to government and green building industry customers.	\$75,000
Architect Outreach Project	Outreach & Promotion/Education & Training—Developed a framework for a catalog of tire-derived products and worked with producers and suppliers to begin developing catalog.	\$75,000
Quality Control Training	Education & Training—Developed written materials and conducted two workshops, one on quality control for playground surfacing products, and one for generalized TDP manufacturing. Presented workshops as part of the CalRecycle International Tire Conference.	\$50,000
Market Analysis	Research—Reviewed CalRecycle data sources, developed and implemented a protocol for annual waste tire market reports, including compiling data from the waste tire manifest system, data from processors and TDP producers, and a standard tool for analyzing and reporting results.	\$150,000
Barriers & Myths	Prepared a literature review identifying information sources related to TDP performance benefits and concerns, with a focus on claims of health related concerns.	\$25,000
<b>TBAP Contract #2 – Ongoing; Contract Ends May 2011</b>		
Market Penetration Analysis	Research—Estimate maximum market size by market segment, current penetration and reasonable targets for expansion. Consider barriers, optional approaches and costs. Incorporate results into Program Evaluation Report.	\$85,000
TDA Marketing Plan	Planning & Performance Measurement—Summarize current/ongoing TDA market development activities, assess TDA market trends and opportunities; and develop a marketing strategy to help guide CalRecycle activities.	\$61,500
Government and Green Building Sales Support	Outreach & Promotion—Completed catalog of California products begun in first TBAP contract; will develop outreach materials and pilot outreach to state and private architects and recommend outreach approaches for future CalRecycle efforts.	\$225,000

<b>Project</b>	<b>Description</b>	<b>Budget</b>
Quality Control and Process Improvement Training	Education and Training—Developed a compendium of standards and a training manual on Quality Control and Process Improvement for TDP producers. Conducted training as part of CalRecycle's January 2010 Tire Conference.	\$95,000
Industry Collaboration and Network	Business and Technical Assistance—Survey California processors and TDP producers to gauge interest in collaborative activities; form and coordinate a steering committee; develop a plan for initial activities; launch 1-2 initiatives and seek industry support/buy in to continue efforts outside of state support.	\$250,000
Carbon Footprint Analysis & Best Practices	Business and Technical Assistance—Conduct a literature review to identify and characterize tools for estimating greenhouse gas emissions, policies and reports related to waste tire recycling and greenhouse gas emissions. Work with interested firms to analyze their carbon footprint; and investigate the need for, and interest in, specific life-cycle analyses involving TDPs and competing products.	\$135,000
Website Support	Outreach and Promotion—Assist CalRecycle in organizing and managing the TBAP website; edit TBAP sector project documents to comply with ADA requirements prior to posting. Help organize and manage a Share Point team site.	\$30,000
2010 and 2011 Tire Conference Support	Education and Training—Assist in organizing, planning, and conducting two tire recycling workshops.	\$32,700
2009 and 2010 Annual Tire Flow Analysis	Research—Conduct research and prepare two annual waste tire market reports documenting the market disposition of California-generated waste tires, and prepare two mid-year market trend updates.	\$250,000
Program Evaluation Project	Planning and Performance Measurement—In close coordination with CalRecycle staff, develop an evaluation framework, research market trends and CalRecycle activities, and prepare a report evaluating CalRecycle's approach, activities, goals and strategies for waste tire market development, providing recommendations to aid in achieving future goals.	\$225,000
Policy Analysis	Planning and Performance Measurement—Conduct a high-level evaluation of options for legislation or other policy changes to support CalRecycle's waste tire market development program. Incorporate results into program evaluation report.	\$44,000
Ad Hoc Inquiries and Miscellaneous Activities	Business and Technical Assistance—Upon request by CalRecycle staff, assist in vetting prospective tire recycling ventures, and undertake other activities related to waste tire market development and CalRecycle programs.	\$88,000

In addition to business grants and sector projects, at the request of CalRecycle staff the TBAP contractor undertakes additional activities such as: conducting applicant business assessments; development of program procedures and processes; assistance in identifying and developing contract work plans; program tracking and reporting; and presentations as requested by CalRecycle. The current, second TBAP contract runs through May 2011, and the current Five-Year Plan calls for a third contract to be executed via RFP by that time, with applications for a fourth business service grant cycle likely being due in spring 2011. Since 2005/06, \$8.1 million has been allocated to TBAP. Going forward, \$2 million has been allocated to the TBAP program for FY 2010/11 and 2012/13, \$674,334 for 2011/12

and \$2.5 million for 2013/14. This represents an average of \$1.5 million per year, or approximately 8.2 percent of the tire market development budget.

## **B. Business and Technical Assistance Effectiveness and Lessons Learned**

### **CIVIL ENGINEERING TECHNICAL ASSISTANCE**

Civil engineering technical assistance, and the related education and training, and outreach and promotion activities undertaken by CalRecycle staff and the technical assistance contractor, has comprised the primary vehicle for expanding TDA use in civil engineering projects in California since the late 1990s when guidance manuals were prepared for TDA use in landfill applications. (Two major outreach and promotion campaigns have also included promotion of TDA to local agencies, and are discussed under the outreach and promotion section above.)

The overall approach has mirrored that used to successfully move RAC from an unproven and widely unknown application for ground rubber to a well-established, stable market. The approach begins by conducting research to document the potential for certain applications. Next, demonstrate the applications by proactively funding and providing hands-on assistance to enable a small number of projects to be completed. Then seek to catalyze project sponsors (i.e., Caltrans, local agencies, or private engineers) to use TDA as a replacement for other aggregate or lightweight fill alternatives with some financial or technical support provided by Caltrans. Finally, through outreach and promotion, education and training, and continued technical assistance, seek widespread acceptance of TDA in top priority applications. Ideally, as applications move from unproven to accepted, the amount of funding and technical assistance resources provided by CalRecycle declines. And, CalRecycle's focus turns from Caltrans (which sets specifications for many applications) to local agencies. In the case of RAC, only after 10-15 years of research, demonstration, technical assistance, and funding assistance did Caltrans finally adopt specifications and begin regularly using RAC on an ongoing basis.

Table 4-13 summarizes key TDA civil engineering projects to date supported by CalRecycle. The TDA program is making slow but steady headway in moving several TDA applications towards widespread acceptance, with evidence of declining resource allocations as applications mature. Recent lightweight fill projects have required less funding or assistance from CalRecycle than earlier ones. Caltrans has begun to complete TDA civil engineering projects without assistance from CalRecycle. The Confusion Road project in Mendocino County, for example, was completed by Caltrans in 2009 and Caltrans only utilized \$20,000 for technical assistance, but paid for the TDA itself.



**Table 4-13. Summary of CalRecycle-Supported Civil Engineering Projects**

<b>Year Project Completed</b>	<b>Project Description</b>	<b>County Location (Project Owner)</b>	<b>Number of Tires Diverted (PTEs)</b>	<b>Cost<sup>1</sup></b>
1997	Levee reinforcement project	Plumas (California Dept. of Water Resources)	45,000	\$660,000
1998	Research of tire shreds in septic leach fields (I-5 rest stop)	Stanislaus (Caltrans)	20,000	\$169,400
2001	Lightweight fill for the Dixon Landing interchange embankment	Santa Clara (Caltrans)	660,000	\$350,000
2001	Light rail vibration damping using TDA for 2,000 feet of light rail track	Santa Clara (Valley Transportation Authority)	100,000	\$0 – Paid by VTA
2003	Route 91 Retaining Wall Fill Project	Riverside (Caltrans)	84,000	\$100,000
2006	Route 215 Retaining Wall Fill Project	Riverside (Caltrans)	131,500	\$190,000
2007	Marina Drive landslide repair	Mendocino (Mendocino County)	133,000	\$740,000
2007	Badlands Landfill gas collection system and Lamb Canyon Landfill gas collection system	Riverside (Riverside County)	32,000	\$30,000
2008	Geysers Road landslide repair	Sonoma (Sonoma County)	150,000	\$369,000
2008-2009	Sonoma Mountain Road landslide repair	Sonoma (Sonoma County)	217,000	\$321,000
2008-2009	U.S. 101 Realignment Project (Confusion Hill embankment)	Mendocino (Caltrans)	270,000 <sup>2</sup>	\$20,000 <sup>3</sup>
Ongoing	Kiefer Road Landfill leachate recirculation system	Sacramento (Sacramento County)	70,000 <sup>2</sup>	Unknown
Ongoing	Palomino Road landslide repair	Santa Barbara (Santa Barbara County)	Under design	Unknown

<sup>1</sup> Cost from CalRecycle's budget, not full project costs. CalRecycle's project expenses may include technical services such as project design, procurement of TDA materials, and construction management services.

<sup>2</sup> Estimate based on project design.

<sup>3</sup> CalRecycle provided technical assistance, Caltrans paid for TDA materials.



As a direct result of program activities, use of TDA as lightweight fill in landslide projects is now driven by local agencies and Caltrans independently of CalRecycle funding or assistance, and use of TDA in retaining walls appears poised to expand, as Caltrans headquarters has endorsed its use and is requiring regions to evaluate TDA whenever lightweight fill is required in such projects. A handful of other applications are also in the early stages of development, each facing key barriers, such as use of TDA in light rail vibration dampening projects, or in residential septic applications. Program staff is well aware of the barriers, for these early-stage applications in California are making widespread adoption of the more readily usable products a higher priority.

While the TDA technical assistance program has made progress in systematically addressing priority opportunities and barriers, leveraging this success to catalyze widespread use of TDA in non-landfill applications has so far proven elusive. One key reason is the challenge of ensuring an adequate supply of TDA in each region of the state where it is required. Processors have expressed a reluctance to enter the market before demand is established, but expanding demand for projects that require large quantities of TDA is challenging without a demonstrated supply. Program staff and contractors have identified prospective strategies to address this classic chicken-and-egg dilemma, but to date has overcome the TDA supply barrier mainly through close coordination of supply, working with waste tire processors and project sponsors to ensure supplies of material meeting specifications are available.

TDA use in landfill gas collection projects, first demonstrated by CalRecycle in the 1990s and supported by guidance manuals and technical assistance, has become common in a small number of California landfills. However, there has been less outreach to the landfills since then, and there appears to be much higher potential for use of TDA in landfills. CalRecycle is updating research and educational materials in order to develop an updated guidance manual. CalRecycle staff is currently conducting research and plan to update the landfill TDA guidance manual and distribute it along with outreach materials developed through the new Green Roads outreach contract.

Overall, technical assistance activities appear to have directly contributed to increasing diversion of waste tires in civil engineering projects in California, from 1.8 million PTEs in 2003 to 2.8 million PTEs in 2008. Most of this use is in landfill applications, with typically one or two transportation-related projects per year. And, due to the sporadic nature of projects, quantities have a tendency to abruptly rise and fall as projects are begun and ended. The question of how the civil engineering technical assistance contract can best catalyze ongoing use of TDA independent of state support is critical to the program's effectiveness, and is an ongoing subject of discussion by TDA staff and contractors. A separate TBAP project will result in a detailed TDA marketing strategy in summer 2010.

### **RAC TECHNICAL ASSISTANCE AND TECHNOLOGY CENTERS**

The RAC technical assistance contract and technology centers have assisted state and local agencies to help spur their use of RAC. With RAC use by Caltrans now regular and widespread, local agencies are the next logical target. Data are not available on the use of RAC by local agencies outside of CalRecycle grant-funded projects, but there is anecdotal evidence that use is growing, especially in Southern California, at least in part due to the assistance provided through these activities. Sustained high interest in both RAC use and targeted grants indicates a degree of effectiveness of the activities in increasing awareness of RAC and state funding opportunities.

CalRecycle's RAC program staff continue to tailor the use of technical assistance to meet the specific opportunities and barriers to expansion. The current contract will include technical assistance designed to help small and/or remote jurisdictions to work together on joint procurements, with the aim of overcoming cost and/or supplier issues while exposing new city and county staff to the product. Technical assistance activities also appear to be helping to spur development and expanded use of additional types of rubber asphalt products, such as chip seals and terminal blend, which can complement the more established RAC applications.

While it is impossible to identify the precise role of these technical assistance activities compared to the RAC grant programs and the Caltrans RAC use mandate, they have all worked in tandem to increase use of RAC in California from 2.6 million PTEs in 2003 to 4.3 million PTEs in 2008, establishing California as a leading state in the use of recycled rubber in pavement applications.

### **TBAP – BUSINESS ASSISTANCE GRANTS**

TBAP business assistance grants was a brand new program unlike any other previously employed, prior to its launch in 2006. The program is directly targeting and addressing a variety of specific business needs, and more broadly, addressing barriers related to strengthening the TDP supply infrastructure while serving to help diversify and expand demand by strengthening and assisting TDP producers and installers in their marketing and sales activities. The program continues to address implementation challenges through refined practices as it evolves.

Tire management firms generally are small enterprises, often family run, although they also include some medium-sized national firms with multiple facilities. These firms face a host of classic small business challenges, including cash flow challenges during periods of growth, operational challenges related to managing information and maintaining equipment, and the challenge of prioritizing management time, especially related to articulating and implementing clear growth strategies, rather than operating more in a day-to-day mode.

As described in the overview above, 39 firms have received business assistance grants, with 15 of these participating in the program a second time, for a total of 54 approved and executed assistance grants (23 of which are still under way).

The program has successfully secured participation by a range of firms with vastly different positions within the TDP supply infrastructure, and vastly different needs. For example, participants have included:

- Seven waste tire processors, three of which also produce a variety of TDPs from ground rubber.
- Twenty producers and installers of established products such as playground surfacing products, athletic fields and rubber mulch. These firms have expanded sales via product testing and marketing materials including websites. In two cases, CalRecycle supported successful efforts to shift feedstock used in pour-in-place playground products from rubber buffings to ground rubber, thereby pulling additional material from the waste stream.

- Seven feedstock conversion firms seeking to change their raw material in whole or part to ground rubber. Although demand increases for ground rubber have been modest to date, these firms have the potential to expand demand significantly in new product types.
- Two firms that were exploring expansion into the waste tire processing and TDP production arena, but who decided not to do so after a review of opportunities conducted through the TBAP program.

These firms received a wide variety of services, depending on their specific needs, including:

- Marketing assistance valued at \$1.7 million was provided to 35 firms through 41 grants, which resulted in new or refined marketing strategies; sales tactics and collateral; development of websites, logo and tagline designs; and trade show materials.
- Product services testing valued at \$970,000 was provided to 27 firms, providing documentation of product performance in relation to health, safety, fire safety and other standards.
- Business assistance services valued at \$1.4 million have been provided to 37 firms via 43 grants, including refined business strategies; management prioritization; tracking of profit and cost centers; and enhanced management practices.
- Technical assistance services valued at more than \$1.1 million were provided to 27 firms via 29 grants, including optimizing production capabilities; improving cost efficiency; reformulating products; and enhancing quality assurance procedures.

Although in some cases grantees may have undertaken the above activities on their own, it is clear that many would not have undertaken these activities in the absence of the grant program, or that they could not have undertaken them at the same level of effort.

Twenty-one TBAP participants responded to a recent survey (although not every respondent answered every question). The results of this survey include: 13 respondents (62 percent) said they increased their diversion by 0-10 percent, four respondents (19 percent) said they increased it by 11-20 percent, one respondent said they increased their diversion by 21-30 percent, one indicated that they increased diversion by 41-50 percent, and another indicated that they increased diversion by more than 80 percent. Sixteen of 21 respondents (76 percent) said TBAP helped them to increase sales by between 0-10 percent, two respondents (10 percent) indicated that TBAP helped them to increase sales by 11-20 percent, and one respondent (5 percent) indicated that TBAP helped them increase sales by more than 80 percent.

Fourteen respondents (64 percent) said TBAP helped them to reduce production costs or increase efficiency by 0-10 percent, six respondents (27 percent) said costs were reduced between 11-20 percent, one said between 21-30 percent, and one indicated that TBAP helped their company reduce operating costs or increased efficiency by 41-50 percent.

Sixteen of 21 respondents (76 percent) indicated that TBAP helped them to increase quality by 0-10 percent, three (14 percent) indicated that quality increased by 11-20 percent and two (10 percent) said quality increased by 21-30 percent.

Sixteen firms reported increasing or retaining employment.

Overall 19 of 22 firms (86 percent) report a favorable view of the program (with 15 firms reporting a highly favorable view), and 21 of 22 (95 percent) reported a favorable view of CalRecycle's administration of the program. Twenty (of 22) respondents (91 percent) plan to apply for assistance again through the program. On the whole, 13 of 22 respondents (59 percent) report that the program had contributed to their firm's success, while another 8 (36 percent) indicated that it was too soon to tell.

Some businesses have expressed concern about TBAP. In the first two program cycles, several firms that had previously received equipment grants expressed disappointment that the TBAP program had replaced the equipment grant program, and two firms mentioned this in the recent survey. Subsequent to the second cycle, CalRecycle announced the new Tire Equipment Loan Program (described above under funding assistance), which four firms have since used to gain equipment financing. Two other concerns expressed involved an inability to self-select contractors and administrative costs. Through all three cycles, administrative costs charged to business grants have not exceeded 5 percent, and are used to support scope development and coordination of the contracting team with the firm. The contractor team, in close coordination with CalRecycle staff, has endeavored to accommodate business grantee requests for specific contractors within the boundaries of state procurement requirements, and has added many specific firms at their request.

TBAP business assistance grants are still a relatively new, complex program that continues to evolve and be improved. It has tested the boundaries of state procurement and tire program authorities in many ways, and CalRecycle staff, TBAP consultants, and participating firms have all played a role in the continuing refinement of the program. Steady progress has been made in a number of areas. For example, in the first TBAP cycle it took more than six months from Board approval to execution of the grant agreement enabling assistance to begin; now paperwork has been adjusted so that assistance begins upon approval (now at the staff level). Several options for continued program refinement are offered at the end of this subsection.

### **TBAP – SECTORWIDE PROJECTS**

Table 4-13 above identifies the 20 sectorwide projects conducted under the first two TBAP contracts, several of which are still ongoing as of the time of this report. While these sector projects employ a variety of market development mechanisms, they are discussed in this Business & Technical Assistance section to provide an evaluation of all TBAP activities in one place. (They are also briefly discussed under other mechanisms above, as appropriate.)

TBAP sectorwide projects have been identified in the program Request for Proposals used to secure a contractor, with proposers providing a proposed approach. However, in practice CalRecycle has worked with the TBAP contractor and stakeholders to refine the approach to RFP-identified projects and/or to identify other priorities in line with the overall objective of strengthening the supply chain and diversifying and expanding demand. A wide range of considerations have contributed to the projects ultimately implemented, and the process of approving the projects has led to a time crunch to complete the projects under the contract term. While stakeholders have been invited and encouraged to aid in developing sectorwide projects, in practice they have not been heavily invested in their development or execution. While more focused communication with stakeholders would be beneficial, an additional issue may be the sheer number of CalRecycle activities occurring simultaneously, as sectorwide project development and launching has had to occur more or

less simultaneously with TBAP business application cycles, assessments and the beginning of assistance services.

### ***TBAP Sectorwide Projects – Business and Technical Assistance***

Three ongoing TBAP sectorwide projects are focusing on business and technical assistance services provided broadly to industry as a whole, as opposed to the services provided through business-specific assistance grants.

The ongoing Carbon Footprint Project will provide a summary of information on greenhouse gas and carbon initiatives that is relevant to the waste tire management industry, a tool for estimating a facility's or a firm's carbon footprint, and will evaluate options and needs for more detailed life-cycle analysis pertinent to waste tire management practices. Given growing interest in greenhouse gas emission reductions, and expanding policies, the tools provided are aimed at assisting firms to understand issues and opportunities, as well as to document information on their practices, while assisting CalRecycle in prioritizing waste tire management in broader climate change initiatives. The effectiveness of this project will be measured by the extent that businesses use the carbon footprint tool and/or use the information provided to adjust their operations or marketing practices, and the results of these activities on sales, profitability, and greenhouse gas emissions.

The ongoing Industry Collaboration and Network Project is designed to explore and catalyze the potential for cooperation across firms in the California waste tire management industry. The project is currently developing a new website and basic marketing collateral and messaging to support joint trade show exhibits. It is too soon to determine what the future will hold, but there is currently an active steering committee and projects are moving forward. The project is aimed at addressing the need for more efficient and effective outreach by leveraging and coordinating efforts across firms. Its effectiveness will be better measured as it becomes necessary for the industry itself to provide funding assistance and hands-on support to sustain the effort, at the conclusion of CalRecycle's project. The ultimate measure of effectiveness will be whether the collaborative can aid in increasing awareness and understanding of TDPs and provide useful sales and marketing tools.

Under a final business assistance-related sectorwide project, the TBAP contractor team assists CalRecycle staff in interviewing and vetting proposed waste tire management ventures that are seeking state support. The team has developed a standard letter listing resources and issues project developers should be aware of, and participates in conference calls to provide feedback and assist in determining the best path forward for projects in relation to state assistance. This has proven to be a highly useful, low-cost service that aids both state staff in understanding and coordinating assistance services, and the prospective project developers who gain insight into the current industry status.

### ***TBAP Sectorwide Projects—Research***

TBAP research projects have mainly focused on expanding the amount and type of market information available. In May 2009 a new format for annual Waste Tire Market Reports was published (covering the years 2007 and 2008), along with a new protocol for researching and analyzing data. The report format continued the previous Waste Tire Market Reports prepared by staff, while making adjustments to provide greater detail in reported results. Under the current TBAP contract, two additional annual market studies for

2009 and 2010 will be prepared. While the first report included preparation of a protocol with templates, to date TBAP contractors take the lead on preparing these reports.

The market penetration project is going beyond the annual market flow reports to provide estimates of maximum market size, current penetration and analysis of reasonable targets, by market segment. The report is being undertaken as part of this program evaluation project.

Another TBAP research project evaluated the potential opportunities related to feedstock conversion (established manufacturers switch to using ground rubber from other non-recycled tire rubber feedstocks). Research for the report helped to identify candidates for Cycle 3 of the TBAP program, with several ultimately receiving approved service agreements. The report provided a rough estimate for ultimate demand in this arena (52 million pounds per year of ground rubber), although the number could be much higher as firms become familiar with the raw material aspects of Styrene-Butadiene-Rubber (SBR, the type of rubber used in tires) rubber and experiment with established and new product formulations.

Overall, the above research projects have assisted CalRecycle and stakeholders to understand market trends and opportunities, and provide an important baseline of information for planning and measurement purposes. Costs could be reduced by performing a greater amount of the research in-house in the future, and by enhancing regular tracking mechanisms as discussed under the Planning and Performance Measurement section.

In the survey discussed above, 10 of 17 respondents (59 percent) that were familiar with the market analysis said they found the market analysis reports to be useful, very useful, or extremely useful, while seven of these respondents (41 percent) said they found them to be only somewhat or not useful. An additional five respondents indicated that they were not familiar with or aware of the market analysis.

### ***TBAP Sectorwide Projects—Outreach and Promotion***

TBAP outreach and promotion efforts include an ongoing project to conduct a pilot test of one-on-one outreach sessions to state and private architects, including developing a draft catalog of California TDP suppliers that are relevant to construction industry purchasers. Also associated with this effort, the TBAP contractor researched alternative construction industry databases and how they might be used in the future.

While it is too soon to evaluate the ongoing pilot project, important lessons have already been learned, including the challenge of compiling marketing information from disparate firms, many of whom are competitors, and who have marketing materials of vastly different quality. Also, validating the use of California tires may not be possible without costly confirmation efforts, and it may be necessary to limit participation to California firms only. Finally, better coordination with related efforts is essential, and ideally TBAP outreach would be part of a broader umbrella approach. Outreach could, for example, coordinate with upcoming grant cycles or upcoming construction projects, to provide leads. The project described above included testing distribution of sales leads derived from construction databases.

TBAP has also provided information via a web page on CalRecycle's broader website. In the TBAP survey, nine respondents of 17 that were aware of the website (53 percent) said they found the TBAP website useful, very or extremely useful, while 8 (47 percent)



described the site as not somewhat useful or not useful. An additional five firms indicated that they were not aware of, or familiar with, the website. CalRecycle's tire recycling web pages contain a vast amount of information; however, there remains an abundance of out-of-date information on the broader website and a need to streamline and better organize it to facilitate finding specific information when needed.

TBAP outreach activities, like other CalRecycle tire program outreach activities, would benefit from greater coordination across technical program staff and contractors, and outreach staff and contractors.

### ***TBAP Sectorwide Projects—Education and Training***

TBAP sector projects have included training sessions on selling products to the government sector, to the green building sector, using construction databases to identify sales leads, quality control and process improvement, and support for organizing and conducting two tire conferences. In the survey, nine of the 16 respondents familiar with the tire conference (56 percent) said they found the tire conference to be useful, very useful, or extremely useful, while six of 16 (38 percent) said they found it to be only somewhat or not useful. An additional six firms indicated that they were not familiar with, or aware of, the conference. In the same survey, nine respondents of 17 respondents that were familiar with the TBAP training programs and workshops (53 percent) said they found TBAP training programs to be useful, very useful, or extremely useful, while eight of 17 (47 percent) said they found them somewhat or not useful. An additional five firms indicated that they were not familiar with, or aware of, the TBAP training programs/workshops.

Generally, there is a need for better coordination and sequencing of education and training. Ideally, they would be organized according to a single plan that could be announced in advance, with an emphasis on webinars and joint trainings presented at locations where targeted groups will be in attendance anyway.

### ***TBAP Sector Projects—Planning and Performance Measurement***

Finally, three related TBAP sectorwide projects focus on planning and performance measurement (in addition to the market research projects discussed above, which help track market trends). This report is part of the ongoing Program Evaluation Project, which is evaluating CalRecycle's waste tire market development program and will provide recommendations for future efforts. The project is supported by the Market Penetration Project discussed under research above, and also a separate Policy Analysis Project which will provide a high level evaluation of a range of prospective legislative/policy proposals. Also, a TDA marketing strategy is being developed that provides far more detail on TDA market opportunities and strategies, as well as recommended tactics and implementation considerations designed to help coordinate efforts going forward.

These projects are all aimed at assisting CalRecycle to further refine its approach to waste tire market development, and to provide the information needed to justify proposed approaches. It is too early to gauge the effectiveness of the ongoing projects. However, the analysis and recommendations presented in this report represent the direct outcomes.

On the whole, the TBAP sectorwide projects target priority barriers and involve all industry segments. Some projects have clearly provided valuable information and support (such as the market analysis projects and training workshops that were very well received). However, it is too soon to draw conclusions on the outreach projects and broad business

assistance efforts under way. Several options for refining the TBAP sectorwide project identification and execution are offered at the end of this sub-section.

The effectiveness of TBAP sectorwide projects will ultimately be measured by the extent to which businesses in the industry participate in and benefit from them. There is a clear need for greater communication regarding the projects and buy-in by industry members, although the Industry Network and Collaboration Project is providing a means to bridge that gap. Also, many of the projects are aimed more at supporting CalRecycle program staff (such as this Program Evaluation Report), although they do provide valuable information that may also be useful by industry.

### **C. Use of Business & Technical Assistance to Address Barriers and Opportunities**

Looking to the future, business and technical assistance programs can play a direct role in addressing several of the key barriers listed in Section 3 while promoting the priority expansion opportunities identified in Section 3. Table 4-14 summarizes ongoing business and technical assistance efforts as well as new programmatic options for CalRecycle's consideration. These options are considered and prioritized in Section 7 along with options from other market development mechanisms.



**Table 4-14. Business and Technical Assistance Barriers, Current Activities and Programmatic Options**

Business/Technical Assistance Barriers	Current Activities	Programmatic Options to Consider
<p><b>1. Many state, local and private decision makers and engineers lack staff with sufficient technical expertise to use TDA in civil engineering applications.</b> The use of TDA in civil engineering applications is still relatively new in California, and the fact that Caltrans is developing specifications for retaining walls is promising. However, to expand TDA use by local agencies and private industry, some level of technical expertise will likely be necessary.</p>	<ul style="list-style-type: none"> <li>TDA technical staff and contractors provide assistance to state and local governments and provide a range of outreach and education activities.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and maintain a list of priority regions and projects to assist in both focusing program resources and educating project sponsors and suppliers about opportunities.</li> <li>Coordinate with outreach and education staff/contractors to develop an annual plan for outreach and disseminate.</li> <li>Establish a TDA Technical Assistance Center affiliated with a key organization respected by targeted engineers.</li> <li>Extend technical assistance to private sector engineering organizations.</li> <li>Offer and promote TBAP services to engineering firms and other private sector firms in a position to use TDA in civil engineering applications.</li> </ul>
<p><b>2. Some landfill operators lack expertise to use TDA in civil engineering applications.</b> While at least nine landfills have used TDA in civil engineering applications (three with assistance from CalRecycle), there are an additional 66 landfills that could potentially use TDA in civil engineering applications.</p>	<ul style="list-style-type: none"> <li>Conducting new research upon which to base an updated landfill TDA guidance manual.</li> </ul>	<ul style="list-style-type: none"> <li>Offer a package of technical assistance services to both privately and publicly operated landfills in conjunction with outreach activities.</li> <li>Work with the Solid Waste Association of America SWANA or another appropriate organization to establish certification training programs.</li> </ul>

Business/Technical Assistance Barriers	Current Activities	Programmatic Options to Consider
<p><b>3. Some local government staff still lacks expertise to use RAC.</b></p> <p>While RAC has become fairly common in the southern portion of the state, there are still some communities that resist using it. There is more of a need to provide technical expertise in the northern region, notwithstanding some supply challenges in parts of the region. Further, as new rubber asphalt paving products are introduced, there is an additional need for technical assistance to broaden their use.</p>	<ul style="list-style-type: none"> <li>• Provide technical assistance through expert contractors and publications; focus on use of new technologies and cooperative purchasing in rural, remote areas.</li> <li>• Provide technical assistance through the RAC technical centers.</li> </ul>	
<p><b>4. Businesses in the TDP supply chain have a range of assistance needs.</b></p> <p>Many processors and TDP manufacturers lack specific technical knowledge, staffing or financial resources required to undertake important steps to strengthen their business. Strengthening businesses by providing technical expertise in these areas helps ensure that waste tires continue to be diverted through private-sector firms.</p>	<ul style="list-style-type: none"> <li>• TBAP business assistance grants.</li> <li>• Select sector projects: Industry Collaboration and Network; Carbon Footprint Project; and Vetting of/Assistance to Proposed Ventures.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish maximum TBAP assistance grant amounts that are based on a firm's need, not predetermined size or other operating factors.</li> </ul>

Business/Technical Assistance Barriers	Current Activities	Programmatic Options to Consider
<p><b>5. There is a lack of consistency and quality standards for feedstock and products.</b> When manufacturers' products do not meet certain quality criteria, the result can be a loss of customers for the particular supplier and potentially a decline in demand in the entire industry. Ensuring that products and feedstock meet certain minimum specifications is important for long-term market viability. Some TDP producers have cited problems in the quality of feedstock supply delivered by some California processors.</p>	<ul style="list-style-type: none"> <li>• Provide product testing services and operational efficiency assistance through TBAP assistance grants.</li> <li>• Provide training on quality assurance and procedures through TBAP sector projects.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish a TBAP sectorwide project to work with industry to identify or develop appropriate quality standards, and pilot their use in business-to-business transactions, and promote results as appropriate.</li> </ul>
<p><b>6. Certain product types/applications remain unproven.</b> As new uses for TDA, crumb rubber, and new RAC products are developed, consumers, particularly those making a large-scale investment, will want to be ensured that the product will perform as expected. It is therefore important to continue to develop pilot projects, test them, and use the results to improve the product or promote its success.</p>	<ul style="list-style-type: none"> <li>• Conduct demonstration projects.</li> <li>• Work with universities to further develop technologies.</li> <li>• Work with Caltrans and other and other agencies, as appropriate, to develop specifications for retaining walls and other TDA applications.</li> <li>• Promote feedstock conversion through TBAP assistance grants and sector projects.</li> </ul>	<ul style="list-style-type: none"> <li>• Partner with universities and trade associations to identify and test new feedstock conversion opportunities.</li> <li>• Develop technologies and pilot projects as new products and applications emerge.</li> <li>• Work with Caltrans and other agencies, as appropriate, to develop additional TDP specifications that can be adopted by others.</li> </ul>

Business/Technical Assistance Barriers	Current Activities	Programmatic Options to Consider
<p><b>7. Inherent limitations of tire-derived feedstock impede its usability.</b> Using tire feedstock in some situations may require technical assistance to help determine optimal standards and practices. This may be especially true in emerging “feedstock conversion” applications in which ground rubber replaces all or a portion of the conventional feedstock used to make established products not previously made with ground rubber.</p>		<ul style="list-style-type: none"> <li>• Make feedstock conversion a priority in future TBAP business assistance cycles.</li> </ul>
<p><b>8. Demand can fluctuate widely and be sporadic.</b> This is due to the fact that many projects are large in scale, and are not available consistently. Further, projects may not all be in close proximity to a project, which impacts cost-effectiveness of transportation.</p>	<ul style="list-style-type: none"> <li>• Develop more information regarding processing and manufacturing infrastructure to better understand processing/manufacturing gaps.</li> </ul>	<ul style="list-style-type: none"> <li>• Work with the state to develop a schedule of projects on an ongoing basis, in order to enhance processors’ production scheduling capabilities. For example, coordinate several RAC jobs in one area in the northern region of the state to gain some economies of scale in transporting and applying product.</li> </ul>
<p><b>9. Small-scale/remote projects present transportation cost inefficiencies.</b> This is particularly true with TDA and RAC, which render the TDPs less cost-effective than they would be if they were larger projects. With RAC, equipment limitations (e.g., number of mixing units) also hinder cost-effectiveness for rural areas and small projects.</p>	<ul style="list-style-type: none"> <li>• RAC grant programs provide reimbursement at a higher rate for communities in rural areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Work to synchronize paving and/or civil engineering projects in smaller jurisdictions through cooperative agreements.</li> </ul>

## **D. Business and Technical Assistance – Implementation Issues and Considerations**

Following are some considerations related to implementing business and technical assistance programs that CalRecycle staff may choose to consider:

**Technical assistance activities must be closely planned and coordinated with outreach and promotion activities and education & training activities.** This is especially true of those led by non-program staff. For example, activities conducted under the Green Roads outreach campaigns and the TBAP sectorwide projects initially required bringing consulting teams and non-technical CalRecycle staff up to speed on issues, target audiences, messaging, and approaches. Individuals with technical expertise and outreach expertise each bring important skills to the task. Benefits of the technical expertise can often be more fully leveraged by disseminating project findings in other ways, as appropriate, to assist other stakeholders.

**TBAP Business Assistance Grants will continue to benefit from refinement.** Because the program is still young and evolving, and tests the boundaries of state procurement and tire program legislative authority in many ways, it may be necessary to continue to refine it for some time. Options for CalRecycle's consideration include:

- Streamlining reporting requirements (for example, TBAP Cycle 3 offered an online survey in lieu of an annual report) and/or imposing stricter penalties for non-reporting;
- Streamlining the application process to minimize documentation requirements, while still providing the essential information needed in independent assessments;
- Simplifying eligibility terms and maximum award determinations so that businesses have clear expectations. Although the current eligibility terms and maximum award determinations were developed to be responsive to individual businesses' needs and they acknowledge the differences between different types of firms and their overall strategic importance, they are complex and therefore challenging to determine. For example, it is difficult for emerging businesses and feedstock conversion projects to identify the number of tires they will divert. The terms could be adjusted for simplicity, and a simplified pre-application eligibility determination process could help firms decide if it is worth their time to complete the full application package. One option is to allow the grant amount to be determined by the independent assessment of actual needs, although because the resulting action plans are usually subject to a degree of negotiation, some may be left with a perception that allocations were not fairly distributed.
- Establish a regular cycle for TBAP business grants. Timing challenges related to process and budgetary restrictions have caused a number of challenges. For example, in the current contract, 60 percent of program budget expired midway in the contract, requiring the team to ensure that this portion of work was completed by a specified date. However, because the contract overlapped with the previous contract, work did not begin in earnest until nearly a year into the new contract, causing schedule/deadline challenges. The next application cycle is not scheduled to begin until spring 2011 (a full two years since the last cycle, and has yet to be formerly announced). Establishment of a regular schedule would provide businesses with reasonable expectations and ensure that funding and contractors are in place when needed, without tight performance periods.

- Confirmation of California tires used. While firms must document California tire use, in practice some firms have occasionally used tires from out of state. CalRecycle could establish clearer guidelines and documentation requirements to ensure that California tires are used.

**TBAP sectorwide projects would benefit from several implementation refinements.** While many sectorwide projects are still under way, several important lessons learned point to some options that CalRecycle should consider going forward:

- Coordinate with other CalRecycle activities. While the TBAP sectorwide projects have been useful, they could be more effective if better coordinated with other CalRecycle activities and provided with sufficient time for execution.
- Better communication and outreach with stakeholders. While stakeholders have been invited and encouraged to help define and execute sectorwide projects, there is a clear need for greater involvement. The options described below related to providing more time, greater coordination across CalRecycle projects, the number of simultaneous activities and regular electronic newsletter updates could also greatly assist in increasing stakeholder involvement.
- Coordination with other CalRecycle outreach and promotion, and education and training activities. Ideally, these activities undertaken through TBAP sectorwide projects should be better coordinated as part of an overall outreach plan and an overall education plan that are communicated clearly to stakeholders.
- Require bidding contractors to propose their approach to pre-determined sector projects with identified objectives, while allowing them to propose new or adjusted objectives or activities. To date bidders were asked to propose approaches to hypothetical sectorwide projects that were not intended to be implemented. This change could help to streamline the launching of sectorwide projects and also provide a clear foundation for coordinating with other outreach and education activities.
- Ensure that RFP and contract timing allows ample time to execute sector projects. Sectorwide projects under the first two TBAP contracts were forced to be completed within an extremely condensed time period, due to a number of contracting, budgeting and logistical factors. This severely challenged the contractor team, CalRecycle staff responsible for managing the contracts, and the business community who were invited to participate in the projects.
- Execute fewer projects at once, such that CalRecycle staff and contractors can provide more focused resources. The sheer number and size of sectorwide projects has been a challenge, especially given the timing constraints noted above.
- Develop staff capacities in-house to undertake market research and other sector projects. This would ultimately reduce contractor costs and enhance the ability of in-house staff to track market trends and opportunities.
- Establish performance measures and a reporting template at the outset of projects. This would benefit all CalRecycle market development projects. For TBAP sector projects, it will help illustrate the different focuses they have. For example, some are oriented towards supporting CalRecycle programs and staff, while others are aimed at engaging industry in outreach and promotion activities.
- Use the TBAP contractor to disseminate a periodic electronic newsletter providing updates of interest to private firms involved in waste tire management. This would greatly aid in

concisely communicating to stakeholders the breadth of resources, activities, and opportunities available through CalRecycle programs.

# Section 5

## Evaluation of Planning and Performance Measurement Activities

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This section focuses on CalRecycle planning and performance measurement activities related to tire market development. First, we summarize current practices. Next, we offer conclusions regarding the effectiveness of these practices, along with options for consideration. These options are considered along with other programmatic and policy options in Section 7, where we present overall conclusions and recommendations.

### ***Current Planning and Performance Measurement Practices***

#### **Planning**

CalRecycle is mandated to regulate and manage waste tires within the state in order to protect public health and the environment and to develop new markets for waste tires. As part of its responsibilities, outlined in the California Tire Recycling Act of 1989 and its subsequent revisions, CalRecycle submits an updated Five-Year Tire Plan to the Legislature every two years that identifies priorities, performance criteria, and budget allocations. Specifically, Public Resources Code Section 42885.5(b) stipulates that:

*On or before July 1, 2001, and every two years thereafter, the board shall submit the adopted five-year plan to the appropriate policy and fiscal committees of the Legislature. The board shall include in the plan, programmatic and fiscal issues including, but not limited to, the hierarchy used by the board to maximize productive uses of waste and used tires, and the performance objectives and measurement criteria used by the board to evaluate the success of its waste and used tire recycling program. Additionally, the plan shall describe each program element's effectiveness, based upon performance measures developed by the board.*

The Five-Year Plans are divided into the following sections, which are referred to as program elements, as defined in Public Resources Code (PRC) section 42885.5(b):

1. Enforcement and Regulations Relating to the Storage of Waste and Used Tires
2. Waste and Used Tire Hauler Program and Manifest System
3. Cleanup, Abatement or Other Remedial Actions Related to Tire Stockpiles Throughout the State
4. Research Directed at Promoting and Developing Alternatives to the Landfill Disposal of Tires
5. Market Development and New Technology Activities for Waste and Used Tires

For the purposes of this evaluation, the sections of most interest are 4 and 5. Within each section, the plan describes the following:

- Program background and status;



- Direction provided by SB 876;
- Objectives;
- Performance measures; and
- Activity description and budget.

The tire programs, collectively, are designed to reach CalRecycle’s strategic directive goals of:

1. Raising the statewide tire diversion rate to 90 percent by the year 2015; and
2. Ensuring that 100 percent of waste tire facilities are in compliance or under compliance orders by 2009.

The goals are supported by “priorities.” These priorities are adjusted every two years when the plan is updated. Presented in the box below are the current priorities.

**Priorities in Current Five-Year Plan that Involve Market Development:**

1. Work with stakeholders to remove barriers that slow market expansion and to create a strong and vibrant tire-derived business infrastructure that supports a sustainable market for all tire-derived products.
2. Promote the use of rubberized asphalt concrete, particularly at the local level; work closely with state and local public works departments to expand and diversify the use of tire-derived aggregate for civil engineering applications; promote the use and purchase of other existing tire-derived products; and work with industry to create new products that will help divert waste tires from landfills.

Objectives that support the priorities and measures to evaluate success in achieving these objectives are stated in the plan for each program element.

CalRecycle staff indicates that during the development of the Five-Year Plan, program supervisors e-mail their “sections” to a point person and they are compiled. The person who compiles the plan also keeps a running list of ideas heard throughout the prior two years and reminds each supervisor of those ideas while the plan is being developed. CalRecycle management then discusses and revises the plan elements as they see appropriate. In the past the plan was approved by the Board. Therefore, some Board members would have discussions with CIWMB management to convey their ideas and priorities. The plan is then reviewed by higher levels of management and historically there would be at least two Board hearings. Ultimately, based on stakeholder input, discussions at the Board hearings and internal discussions, the Five-Year Plan would be finalized and approved by the Board.

CalRecycle is not governed by a board; however, CalRecycle indicates that there still will be public meetings to solicit input from stakeholders regarding the Five-Year Plan.

Other opportunities exist to hear public and interested party feedback regarding CalRecycle programs, which is incorporated into the planning process. These include tire-related workshops, Tire Interested Parties meetings, advisory group meetings, etc.

## **Performance Measurement**

Assessment of the market development programs is generally conducted in three ways:

1. Assessment of progress using program measures defined in each Five-Year Plan;
2. Surveys and solicitation of feedback;
3. Reports provided by grant and loan recipients; and
4. Additional studies and reports conducted by CalRecycle staff, other agencies (Caltrans) and contractors.

Performance measurement activities in each of these three areas are discussed in detail below.

### **FIVE-YEAR PLAN PROGRAM PERFORMANCE ASSESSMENT**

Tracking of program performance based on identified Five-Year Plan program measures is typically completed by program managers. Each plan edition reports on progress made in achieving the prior plan's performance measures. In addition, new performance measures are proposed for use in the period covered by the new plan.

### **SURVEYS AND SOLICITATION OF FEEDBACK**

In general, all of the grant programs have at one point conducted surveys, are in the process of conducting a survey, and/or had a private entity conduct a survey of their program recently. Surveys are also used to determine the results of selected other programs as well, including training events and conferences, and selected outreach programs.

#### ***Tire-Derived Product Grant Program***

The TDP grant program conducts an annual survey of its grantees. The survey is analyzed and a report is developed, which helps the program supervisor assess and consider changes for the program. The survey asks about:

- The grantees' perceptions of the grant process;
- The quality of the TDPs installed;
- Whether the grantee has purchased, or will in the future purchase, TDPs without grant funding.

This program has the most consistent survey efforts of the tire programs evaluated. The last survey had 81 responses, which staff indicates is approximately a 20 percent response rate. It is expected, however, that response rates will continue to improve, because responding to surveys for a five-year period has become a recent requirement of the grant program. Information obtained appears to be potentially helpful not only to program staff, but also to product manufacturers and to those considering purchasing TDPs. Staff indicate that portions of the information obtained through the survey efforts (such as information pertaining to whether the respondent has purchased TDPs without grants, whether there have been safety improvements as a result of the TDPs, and level of satisfaction with the products) is shared at the next grant award presentation. When the 2009 survey was issued, respondents who indicated that they had concerns about the safety of and/or environmental impacts of tire-derived products were sent an e-mail by staff providing links to studies on the CalRecycle website regarding this topic, which is

a good example of leveraging activities effectively and efficiently. Beyond that, however, the information obtained from the surveys is typically not used further.

### ***RAC Grant Program***

The RAC grant program is currently finalizing a draft survey to be sent to RAC grant recipients. It is hoped that the survey will be distributed in May 2010. The survey will request information about:

- The perception of the grant process;
- Feedback received regarding the quality of the RAC installed; and
- Likelihood of using RAC in the future.

### ***RAC Outreach Campaign Survey***

Katz & Associates is the contractor for CalRecycle's outreach campaign regarding RAC and TDA usage. They contracted with Action Research to conduct a "before and after the campaign" survey to understand residents' knowledge about tire-derived products, and specifically RAC, in order to gain an understanding of the effectiveness of the outreach campaign. Specifically, residents were asked about their knowledge, awareness and attitudes about the use of RAC in highway construction projects and the use of TDA in light rail and other civil engineering construction projects. The survey was designed to test potential campaign messages and establish a baseline to use for comparison following the two-year campaign. The pre-campaign survey was conducted between March 18 and April 1, 2010. Households were selected randomly from 23 selected counties. The post-campaign survey will be conducted after Katz & Associates completes its outreach campaign.

### ***TBAP Grant Survey***

CalRecycle recently had a subcontractor conduct a survey of all TBAP grant recipients. Responses were received by 23 companies, out of a possible 39. Eight of the respondents participated in Cycle 1 and, of these, six also participated in TBAP Cycle 3. Six respondents participated in both Cycle 2 and Cycle 3, and seven respondents participated in Cycle 3 only.

The survey requested information about:

- Type of assistance received;
- Number of PTEs the companies diverted in 2009 (and what portion were from California);
- The usefulness of certain sectorwide activities;
- The benefits/business enhancements gained through the TBAP assistance/grant (e.g., increased sales, reduced production costs, increased volume or capacity, improved quality, etc., contribution toward overall success);
- Whether the company was able to accomplish what it hoped to using the grant/assistance;
- What additional investments the company was able to make or avoid making thanks to the TBAP assistance received;
- Experience with the services the company received through the program, as well as experience with staff/program administration;

- Whether the company plans to apply for another TBAP grant in the future; and
- How the program can be improved/other services the grantee would like to see offered in the future through the program.

### **REPORTS FROM GRANT AND BUSINESS ASSISTANCE RECIPIENTS**

Recipients of tire grants and loans are required to provide reports to CalRecycle. Specific requirements vary, depending upon the grant. For example:

- The TDP grant program requires that grantees submit two progress reports (due by specified dates, one year apart) and a final report upon completion of the project (projects must be completed within two years). Progress reports should include information such as progress to date, issues encountered, and any changes in project anticipated. The final report is to include vendor/supplier information, number of tires diverted, project size, product type utilized, lessons learned, and future maintenance plans. In addition, final reports should include two digital photographs and two printed photographs of the project, including the required signage. CalRecycle also requests that any print material or brochures about the project be submitted with the final report.
- The RAC grant program requires that grantees submit one progress report (by a specified date) and a final report upon project completion. The progress reports must provide a description of progress to date, timeline for project completion, changes in the project, issues encountered, vendor/supplier information, and any changes in contact information. The final report is to provide a thorough description of each of the projects included in the grant, tons of RAC used, amount of rubberized binder used, and amount of rubber chip seal used, amount of rubber used, results of quality assurance, cost of materials, and number of tires diverted. The grantee must submit verification from the supplier that 100 percent of the tires were California-generated. Two digital photos of the project(s) and two digital photos of the signage are also to be submitted. Information about vendors/contractors is also to be submitted, including name, address, contact information, amount paid, description of work completed, and a Reliable Contractor Declaration.
- TBAP requires recipients of assistance to submit annual reports as well as final reports. Annual reports are required for a period of five years after the grant period ends, in order to evaluate the effectiveness of the program. Annual reports are to contain a concise summary of the assistance provided, results achieved, and a description of any problems encountered as well as how they were resolved. Year-end financial statements are also to be submitted, as well as tax information, amount of crumb rubber used or PTEs processed and sold, verification that all waste tires are generated in California, and the average number of employees and full-time equivalents. The final report is to include the same information (updated) as in the annual reports, along with any copies of pertinent printed materials, and digital photos depicting changes of the facility, if appropriate. Reporting compliance has been very low and in practice, CalRecycle has allowed business grantees to comply with the reporting requirement either by responding to a survey and/or allowing the contractor to submit a summary of their TBAP assistance or services.

### **ADDITIONAL STUDIES**

Occasionally CalRecycle has commissioned a third party to conduct research regarding the effectiveness of tire programs, or examine additional possibilities for market development programs. In some instances staff has completed assessments of programs or compiled grant

information. Such studies completed by staff allow the staff to review the effectiveness of their program in a more in-depth manner than the typical Five-Year Plan process would allow. Studies conducted by third parties provide the added benefit of a different, outside perspective, perhaps with experience in other areas, which can provide a unique perspective and perhaps new ideas for the program(s) being evaluated. A summary of such known publications is provided in Table 5-1.

**Table 5-1. Summary of Tire Program Evaluation Studies**

In-House Studies	Third-Party Studies
<ul style="list-style-type: none"> <li>Waste Tire Commercialization Grants, Abstracts and Status Updates: FY 1998/99-2004/05, December 2004. <a href="http://www.calrecycle.ca.gov/Publications/Tires/62204012.pdf">http://www.calrecycle.ca.gov/Publications/Tires/62204012.pdf</a></li> <li>Waste Tire Management Grant Abstracts: 1998-99, June 2002. <a href="http://www.calrecycle.ca.gov/Publications/Tires/62202003.pdf">http://www.calrecycle.ca.gov/Publications/Tires/62202003.pdf</a></li> <li>California Waste Tire Program and Evaluations, June, 1999 (1999 Evaluation Study) <a href="http://www.calrecycle.ca.gov/Publications/Tires/54099006.doc">http://www.calrecycle.ca.gov/Publications/Tires/54099006.doc</a></li> <li>Overview Report on California's Waste Tire Program, October 1998. <a href="http://www.calrecycle.ca.gov/Publications/Tires/54098007.doc">http://www.calrecycle.ca.gov/Publications/Tires/54098007.doc</a></li> <li>Tire Recycling Program Evaluation, January 1997 (Not an evaluation, so much as a Program Summary) <a href="http://www.calrecycle.ca.gov/Publications/Tires/43297002.doc">http://www.calrecycle.ca.gov/Publications/Tires/43297002.doc</a></li> </ul>	<ul style="list-style-type: none"> <li>Caltrans SB 876 Annual Report, 2009 <a href="http://www.dot.ca.gov/hq/oppd/rescons/sb876.htm">http://www.dot.ca.gov/hq/oppd/rescons/sb876.htm</a></li> <li>An Analysis of Subsidies and Other Options to Expand the Productive End Use of Waste Tires in California, 2002 (2002 Evaluation Study). <a href="http://www.calrecycle.ca.gov/Publications/Tires/62002006.pdf">http://www.calrecycle.ca.gov/Publications/Tires/62002006.pdf</a></li> <li>California Waste Tire Program and Evaluations, June 1999 (1999 Evaluation Study). <a href="http://www.calrecycle.ca.gov/Publications/Tires/54099006.doc">http://www.calrecycle.ca.gov/Publications/Tires/54099006.doc</a> Section 2 of this Study, Evaluation of Board Programs, completed with significant input from a contractor, VITETTA.</li> </ul>

These other studies have provided guidance and direction regarding the waste tire program in general. More specifically, *program evaluation studies* were completed in 1999 and 2002. Each contained numerous recommendations for improving the waste tire program as well as proposed certain changes in related policy. This program evaluation study now underway is another example of a broad evaluative study cover the market development and research program elements, specifically.

*The Caltrans SB 876 Annual Report* is an annual report that SB 876 requires Caltrans to submit to CalRecycle. This report indicates the amount of tires Caltrans uses annually. Typically the largest use is rubber hot mix asphalt (RHMA). Additional waste tires used include TDF usage that Caltrans estimates based on the amount of cement Caltrans uses, TDA in civil engineering applications, and other uses such as newer types of RAC products and weed mats.

*The Waste Tire Commercialization Grant Abstracts* (2002 and 2004) are more of a summary about information regarding Waste Tire Grant purposes and results for the years of the summary—the most recent of which is the 2004 study, which covers grants awarded in five fiscal years (no grants were awarded for FY 2000/01). During this timeframe 40 grants were awarded to 28 businesses. The profile for each grant includes the purpose of the grant (drawn from the application), the outcome of the grant (based on a submission of a progress report) and “current status” which is presumably based on the final report or subsequent correspondences with the business. The output is limited in its value, as many firms could not yet state how the grant award would help them improve their business. Further, the question regarding estimated PTEs diverted due to the grant appears to be unclear to some—e.g. whether it meant total PTEs diverted by the company, or total incremental PTEs diverted due to the grant.

## ***Effectiveness of Current Planning and Performance Measurement Process and Recommendations for Consideration***

Provided below are findings regarding the current planning and performance measurement process and recommendations for consideration:

### **Planning**

- **Need for a strategic plan.** Although they address a five-year planning period, the Five-Year Plans have primarily served to define two-year programs of work and are largely tactical and budgetary in nature. A formal strategic plan guiding biennial work plan development has not yet been drafted, although CalRecycle staff has certainly been engaged in strategic thinking. What is needed is a distinct five-year strategic plan and separate biennial work plans that are in alignment with the strategic plan.

Through this program evaluation project, CalRecycle staff and stakeholders have agreed on overarching waste tire program goals, a vision reflecting desired results for developing a healthy and thriving marketplace for California waste tires, guiding principles, and priorities for increasing market penetration and the barriers that need to be overcome in order to do so. The results of this program evaluation, as well as a strategy planning session scheduled to be conducted after the report is complete, will serve as a foundation for development of the upcoming Five-Year Plan, which we recommend to include both a strategic planning component as well as a two-year work plan component. We also recommend that programs be assessed and fine-tuned annually, with respect to activities and budgets.



- **Need for market-driven planning approach.** Program managers submit their plan sections to one person, who “pulls it all together.” This approach enables each program manager to propose enhancements and expansions to their respective programs, as they see fit, based on experience and feedback received during the previous two years. However, program managers under this planning model are likely to have a natural tendency to seek to enhance their programs for the sake of having strong programs. Such a program-driven versus market-driven planning approach may result in a misfit between market development priorities defined by market needs versus program development priorities defined by program managers.

Preparation of a guiding strategic plan is one step in creating a more holistic planning approach. Engaging program managers in addressing strategic plan objectives and market needs as determined through periodic market assessments will help to ensure programs:

- Are structured in direct response to marketplace needs and priorities;
  - Employ the most appropriate mechanisms for overcoming critical market barriers and realizing market penetration opportunities; and
  - Are well integrated and well coordinated to make efficient use of available resources.
- **Despite the lack of a formal strategic plan and a separate strategic versus work plan development process, CalRecycle appears to have been relatively on target with respect to addressing marketplace needs and priorities within individual programs.** This is likely due to the collective involvement of management and staff with ongoing input from industry stakeholders. CalRecycle’s use of stakeholder involvement mechanisms and application of the resultant input is noteworthy and has clearly helped to build the success of CalRecycle tire program efforts.
  - **Several programs that are supposed to be market development or research programs directed at promoting market development are not.** For example:
    - **Research**—Activities aimed at developing minimum energy efficiency standards for replacement tires. They could potentially fall under the category of “waste minimization” or “resource conservation,” but is not market development.
    - **Tire Sustainability Outreach**—This outreach program focuses on changing tire maintenance behaviors of Californians. This is an expansion of the campaigns conducted in the Bay Area and Fresno markets that educated drivers about proper tire maintenance, encouraged their customers to leave their old tires at the dealer when buying new tires, and educated consumers about purchasing longer-life tires.
    - **Other Non-Market Development Activities**—These include sharing educational materials with the border region and providing waste management planning assistance to Baja California.

It would be more appropriate if plan language related to these non-market development programs were removed from the “market development” plan section and described separately, given that these programs address entirely different goals and objectives.

- **Objectives established in the Five-Year Plans are not always “SMART” (specific, measurable, attainable, relevant, and time-bound).** To effectively gauge program performance, clear objectives are needed as well as program measures that track achievement of these objectives. Performance measurement is discussed below.
- **Need for a coordinated approach to outreach and promotion, and education and training.** Because these market development mechanisms involve engaging external stakeholders in sometimes time consuming and resource intensive exercises, there is a particular need for coordination. Also, because various programs involve these components, there is a high potential for overlap and/or non-aligned activities. To address this CalRecycle could appoint a single lead, or perhaps a small group comprised of technical program experts and outreach or training program experts ,to develop an overarching plan that aligns multiple program activities for the coming two years.

### **Performance Measurement**

Program evaluation and fine tuning of programs in response to evaluation findings are critical to the ultimate success of CalRecycle’s waste tire market development programs. Programs and activities can be evaluated in two basic ways, both of which are addressed in this program evaluation:

1. Is the program aiming at the right targets, and with the right tools?
2. How well is the program hitting the targets and achieving the specified goals and objectives?

In performing an appropriateness evaluation, state recycling market development program evaluators generally seek to determine if their programs are:

- Addressing one or more specific high-priority market enhancement opportunities and the key barriers impeding their realization;
- Leveraging existing programs and resources;
- Operating at a scale commensurate with what is needed to succeed, keeping in mind budgetary limitations;
- Enhancing the ability to move target commodities into the marketplace and out of the disposal stream on a more stable and consistent basis;
- Resulting in changes that would not have occurred without assistance; and
- Diverting additional tonnage from disposal rather than simply moving tonnage from one market to another.

Program evaluators can track and measure outcomes, as well as specific deliverables or outputs aimed at achieving identified desired outcomes. Benchmarking is another tool for evaluating program effectiveness. Following are examples of the types of program effectiveness measures that CalRecycle can use to measure program effectiveness:

#### **Quantitative:**

- Amount of new tires diverted, or capacity for diversion established;
- Dollars spent per ton diverted;

- Amount of tires moved into specific types of markets;
- Amount of additional TDPs sold or otherwise beneficially utilized;
- Economic development benefits achieved;
- Number of new TDP manufacturers attracted or resulting from feedstock conversion efforts;
- Number of jobs created;
- Dollars in capital investment; and
- Dollars in sales resulting from business development activities.

**Qualitative:**

- Market barriers reduced or overcome and how;
- Nature and outcomes of business assistance provided (funding, facilitation, technical assistance, etc. and resultant impact of this assistance);
- R&D efforts supported, and resultant outcomes;
- Stakeholder feedback on CalRecycle tire program performance; and
- Participant feedback on the relevance and effectiveness of training programs, networking sessions, etc.

In selecting measures of effectiveness, the following questions can be asked:

- Will the measures track desired program outcomes (related to goals) as opposed to just outputs and inputs?
- Can information pertaining to the measure be gathered systematically, consistently, and objectively (and quantitatively, to the extent feasible)?
- Is there sufficient time and are there sufficient resources to gather, organize and interpret that information in order to tell a meaningful story for the evaluation?
- Will those reviewing the evaluation results perceive the measures as credible?
- Will the knowledge gained through use of the measures be useful (e.g. for program improvement, adjustment in resources allocated)?

Efficiency evaluations can also be performed, to examine in particular, the resources allocated to achieve certain outcomes.

An important consideration in performing program evaluations is to determine who the target audience for the evaluation results is. Simply put, different things matter to different stakeholders, so evaluations need to be designed accordingly. In addition, evaluation results should be shared with stakeholders to maintain stakeholder confidence that programs are generating results and are being fine-tuned as needed to become more effective.

Timing of performance reviews is also an important consideration. We recommend that programs be tracked at regular intervals, with annual reports reflecting the outcome of performance review activities. The results of these reviews are needed to perform annual work plan updates.

Provided below are some conclusions and recommendations regarding selection of objectives and performance measures, as well as performance tracking, organized by type of program.

### **FUNDING ASSISTANCE (GRANTS AND LOANS PROGRAMS)**

Funding assistance related objectives in the Fifth Edition of the Five-Year Plan include:

1. *Increase the use of RAC and TDA applications by providing grant and contract funds and technical assistance to State agencies and local governments.*
2. *Increase the purchase of TDPs (not RAC or TDA) by providing services and funding to State and local agencies to offset costs and promote sustainable purchase practices.*

In addition, there is a statement in the plan that says: “the goal of the grant programs continues to be to create long term sustainable markets by focusing on first time and limited experience users of RAC. However, the programs will also continue to award grants to encourage local jurisdictions that already use RAC to expand to more projects.”

The Five-Year Plan states that the Market Development Program will use the following measures to evaluate success in achieving its objectives:

1. *Increase the percentage of waste tires diverted from landfill disposal to 85 percent by 2010.*
2. *Establish a baseline for current usage of CE applications by state agencies and local governments by June 2011, and increase the use of CE applications by 10 percent by 2013.*
3. *Raise local government-interest of tire-derived products by 15 percent in 2009, 20 percent in 2010, and 25 percent in 2011.*

It is R. W. Beck’s opinion that the three statements of measures seem to be statements of key objectives and the two stated objectives are actually more suited as goal statements. In order to have effective performance evaluation, clearer language regarding goals, objectives, measures and measurement processes is needed not just with respect to funding mechanisms but for both the market development and research programs in their entirety.

Specific performance measures, such as the quantitative and qualitative measures listed above, are needed to track progress in achieving each objective. Currently, these specific measures have not been explicitly identified although in some cases they are evident based on performance tracking activities that have been undertaken in past years as discussed above.

There is not a consistently applied means of tracking performance using specified performance measures. For example, as discussed in Section 4, substantial data has been collected regarding the grants programs, via funding records, grantee reports and surveys; but ultimate measures of success such as PTEs diverted (versus projected to be diverted) are not tracked uniformly for all funding programs. Data regarding allocated funds by program is available, but because grantees can spend resources over the course of multiple years, expended funds lag, and are therefore not available for several years out. It appears that some programs do not have this data readily available. This data is not included in the Five-Year Plan, only approved funding.

Additionally, reporting requirements for grantees need to be re-evaluated. They appear to be overly onerous in some areas (e.g., submittal of financial information is technically a requirement in TBAP reports), and lacking important information in others. For example, grant eligibility for the TBAP, RAC, and TBAP programs, is dependent upon using 100 percent California-derived

tires. There is some concern that this requirement is not always adhered to. Follow-up reporting might be needed.

Lastly, a key program performance measure, cost per diverted PTE has not been identified as such.

## **RESEARCH & DEVELOPMENT**

Research-related objectives in the Fifth Edition of the Five-Year Plan include:

1. *Work with other state agencies, academia, and research and testing laboratories to ensure that engineering curricula contain a wide range of tire-derived product applications.*
2. *Conduct research and establish programs that support and promote new technology, new uses for waste tires, and improvements to products that use California-generated waste tires.*
3. *Identify research gaps in existing data and determine what areas need further investigation.*

The Fifth Edition Five-Year Plan states that the research program will use the following measures to evaluate success in achieving its objectives:

1. *Investigate and evaluate obstacles to existing and emerging highway construction and civil engineering applications that use tire-derived materials.*
2. *Develop in-house capabilities to track the market for various tire-derived products on an on-going basis.*

With respect to the five above stated objectives and measures, all appear to be strategies instead of objectives or measures. In other words, these statements describe how and what research and development will be carried out instead of the reason (objectives) for doing so, and the specific measures to be used in monitoring to what extent the objectives are realized. In addition, objectives need to be clearly linked to the goals/desired outcomes that they are aiming to achieve.

It is unclear how the performance of research and development activities is measured, other than counting projects. A more direct system of tracking outcomes associated with research and demonstration projects appears to be needed.

## **BUSINESS AND TECHNICAL ASSISTANCE**

There was one business assistance related objective in the Fifth Edition of the Five-Year Plan:

1. *Increase the production capability and cost-effectiveness of processing waste tires into value-added products by offering help with business and marketing plans and equipment upgrades.*

The plan states the following measure to evaluate success in achieving its business assistance objective:

1. *Provide business assistance services to 40 businesses and document successes and obstacles by 2010.*

The measure (actually an objective statement) does seem to relate to the objective statement (actually more of a goals statement). However, documenting successes and obstacles is a means to track performance. Measures of success need to be defined. Although not stated in the plan, CalRecycle does define a variety of performance measures in the form of survey questions and reporting requirements. Grantee surveys and reports are primary tools used to evaluate the company specific services provided through the TBAP program. Additionally, an evaluation

report on the entire program was prepared at the end of Cycle 1, plus this program is evaluated in this Program Evaluation. These evaluation results should be helpful in shaping the future of this program. Lastly, as is true for all of CalRecycle's tire programs, stakeholder feedback is solicited at numerous public meetings, which is also a means of obtaining information about program performance.

## **OUTREACH AND PROMOTION**

The Fifth Edition Five-Year Plan states that outreach efforts are aimed at achieving the following objectives:

1. *Increase the purchase of TDPs (not RAC or TDA) by providing services and funding to state and local agencies to offset costs and promote sustainable purchase practices.*
2. *Increase statewide public awareness on purchasing longer-lived tires, proper care and maintenance, and supporting local use of RAC and CE applications using social marketing techniques designed to include cultural and ethnic considerations.*

One performance measure for outreach efforts is stated in the Five-Year Plan and listed below:

1. *Establish a baseline for current purchase of tire-derived products (not RAC or TDA) by state agencies and local governments by December 2007, and increase purchases by 15 percent by 2010.*

As with those for other program elements, the above objective statements are more suited as goal statements. The stated measure describes a step in the process of tracking program performance followed by a target or objective to be achieved. Given the diversity and magnitude of outreach efforts undertaken, each outreach and promotion program needs its own set of objectives, measures, and performance tracking systems. Performance tracking for such programs would likely entail pre and post awareness campaign surveys, and tracking behavior change.

Pre and post campaign surveys are a part of the evaluation process for the Green Roads campaign. Also, the CIWMB, in cooperation with Department of General Services, developed and implemented an electronic reporting system that tracks state agencies' and the Legislature's purchases of products made from recycled content. These are two examples of sound methods for monitoring the performance of outreach and promotion efforts. All of the major outreach campaigns ideally, should have a plan and budget for monitoring campaign effectiveness. Even more important, however, is ensuring that awareness and promotion activities are targeting appropriate audiences as needed to advance attainment of the state's overall diversion goal.

## **EDUCATION AND TRAINING**

There is no formal education and training program although there are several education and training activities described in the plan. Consequently, there are no formally stated objectives or measures for education and training stated in the Five-Year Plan. In practice, education and training events tend to be evaluated on the basis of participant surveys. The content of some such surveys was described previously in this chapter.

With respect to the use of surveys for education and training as well as evaluation of other market development activities, the following observations were made:

- Surveys have been implemented sporadically for some programs, and not at all for others.

- Only one program, the TDP grant program, is known to require participation in surveys responses (for a period of five years after grant award).
- When surveys are implemented, survey response rates are relatively low, therefore the responses are somewhat limited in their value.
- Information obtained from surveys (including feedback solicited at conferences and workshops) is not always fully leveraged with other programs and activities.
- In some cases survey questions could be more targeted, yielding more useful results and/or shorter surveys. Some survey questions have asked about intentions, for example. It is more helpful and less subjective to inquire about actual behaviors.
- Most surveys do not inquire about barriers to the use of (or increased use of) tire-derived products, specifically. This could provide valuable information.
- Surveys are largely issued electronically, which is relatively low-cost, convenient, and allows for more efficient analysis of data.

#### **Planning and Performance Measurement—Options for Consideration**

Table 5-2 summarizes key needs with respect to program planning and performance monitoring and potential changes that could increase the effectiveness of planning and evaluation processes.



**Table 5-2. Potential Changes to the Planning and Evaluation Processes**

Current Planning/ Evaluation Need	Potential Change	Benefit(s) of Change
<b>Planning</b>		
<ul style="list-style-type: none"> <li>Need for a strategic plan.</li> </ul>	<ul style="list-style-type: none"> <li>Prepare a five-year strategic plan along with two-year work plans, both of which are incorporated in the Five-Year Plan.</li> <li>Update work plans annually.</li> </ul>	<ul style="list-style-type: none"> <li>Annual work plans reflect broader strategic vision and focus.</li> <li>Programs are prioritized, do not overlap, and leverage each other.</li> </ul>
<ul style="list-style-type: none"> <li>Need for a market-driven planning approach.</li> </ul>	<ul style="list-style-type: none"> <li>Focus work plans on overcoming market barriers and realizing priority market penetration opportunities, and develop programming accordingly, balancing resources with identified needs and priorities.</li> </ul>	<ul style="list-style-type: none"> <li>Plans are structured in direct response to marketplace needs and priorities</li> <li>Plans employ the most appropriate mechanisms for overcoming critical market barriers and realizing market penetration opportunities.</li> <li>Plans are well integrated and well coordinated to make efficient use of available resources.</li> </ul>
<ul style="list-style-type: none"> <li>Not all programs, studies, and campaigns included in the “market development” section are market development programs.</li> </ul>	<ul style="list-style-type: none"> <li>Develop a separate section within the Five-Year Plan (e.g., on the same level as enforcement, research, and market development) for programs that do not fit into other categories – for example, “waste reduction.”</li> <li>Include a research category within the market development section.</li> </ul>	<ul style="list-style-type: none"> <li>All program activities are directly tied to overarching program goals and desired outcomes</li> <li>Enhanced clarity regarding true market development costs and activities.</li> </ul>
<ul style="list-style-type: none"> <li>Objectives in the Five-Year Plan need to be “SMART.”</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that all performance measures are specific, measurable, attainable, relevant and time-bound.</li> <li>Avoid complicated formulas.</li> </ul>	<ul style="list-style-type: none"> <li>More accurate assessment of programs.</li> </ul>

Current Planning/ Evaluation Need	Potential Change	Benefit(s) of Change
<b>Performance Monitoring</b>		
<ul style="list-style-type: none"> <li>Objectives and performance measures stated in Five-Year Plans need clarification, need to directly relate to each other as well as to broader plan goals and desired outcomes, and need to measure both appropriateness and effectiveness.</li> </ul>	<ul style="list-style-type: none"> <li>Consider training program for staff on program evaluation techniques.</li> <li>Use a structured approach to developing an evaluation protocol for each significant program element.</li> </ul>	<ul style="list-style-type: none"> <li>Program evaluation plans will be clear and effective</li> </ul>
<ul style="list-style-type: none"> <li>Performance monitoring needs to be scheduled at regular intervals with results documented and shared with program stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>Develop a structured annual review for market development programs to assess program performance. Include annual survey results and updated “expended” figures.</li> </ul>	<ul style="list-style-type: none"> <li>Programs can respond to needs more quickly.</li> <li>Stakeholders are aware of program results and opportunities for improvement.</li> </ul>
<ul style="list-style-type: none"> <li>Cost per PTE diverted and other measures of cost-effectiveness are needed.</li> </ul>	<ul style="list-style-type: none"> <li>Select appropriate cost-effectiveness measures, such as dollars spent per PTE diverted in areas where this is not now done.</li> <li>Ensure that dollars expended and FTEs diverted, to the extent possible, are tracked among all programs.</li> <li>Update any expenditure data so that, when the contract year is closed out, final expenditure data (as well as data pertaining to FTEs diverted) is updated.</li> </ul>	<ul style="list-style-type: none"> <li>Program managers have a better understanding of expenditures and benefits of expenditures.</li> <li>Costly programs can be modified to improve cost effectiveness.</li> </ul>
<ul style="list-style-type: none"> <li>Not all programs survey grantees regularly. Not all that do issue surveys require participation in the surveys as a condition of the grant program.</li> <li>Surveys have low response rates.</li> </ul>	<ul style="list-style-type: none"> <li>Consider an annual survey for all programs. Coordinate surveys with each other so that the responses are comparable in some regards.</li> <li>Make all loans and grants dependent upon the applicant agreeing to respond to surveys for a specified period of time (e.g., five years, as in the TDP grant program).</li> </ul>	<ul style="list-style-type: none"> <li>Higher response rate, increasing the level of significance of survey results.</li> <li>Information regarding impacts that occur after a year or two will be captured.</li> <li>Updated contact lists will help provide outreach and leverage other activities and programs.</li> </ul>
<ul style="list-style-type: none"> <li>Some surveys are overly lengthy, and/or ask questions that are not useful.</li> </ul>	<ul style="list-style-type: none"> <li>Keep surveys as succinct as possible, asking defensible questions, not “intentions” or other questions that could be considered to be subjective.</li> </ul>	<ul style="list-style-type: none"> <li>Survey results are more useful.</li> <li>Higher response rates as surveys are less cumbersome.</li> </ul>

Current Planning/ Evaluation Need	Potential Change	Benefit(s) of Change
<ul style="list-style-type: none"> <li>Waste tire manifest data is not consistently entered and its potential as a tire market tracking tool is not being fulfilled.</li> </ul>	<ul style="list-style-type: none"> <li>Consider changes in data entered to better identify type of material and destinations, and increase enforcement and oversight to ensure consistent use.</li> </ul>	<ul style="list-style-type: none"> <li>Depending on changes, could greatly facilitate and reduce the cost of annual market flow studies and regular updates on market trends.</li> </ul>

## Section 6

# Detailed Evaluation of Selected Programmatic and Policy Options

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This section presents an evaluation of selected programmatic and policy options that could complement or replace current state programs and policies. The purpose is to expand on previous sections that were focused on applying market mechanisms under current legislation and funding levels, by providing a systematic evaluation of options that may require new legislation, adjustment to regulations, and/or fundamental shifts in current policies governing activities. In this section each option is ranked according to implementation desirability (as described below), and these conclusions are then presented at the end of Section 7 in the context of overall project recommendations to help guide CalRecycle in moving forward.

Five categories of options are evaluated: new funding assistance programs; adjustments to state tire program fees; new use mandates; extended producer responsibility mandates; and “other” policies. The specific options considered were identified through discussions with advisory group members, external stakeholders, CalRecycle staff and management, and the consulting team, based on the analysis presented in early sections. The intent is to include key options that could expand diversion and/or achieve other goals that either: a) Might require legislation to implement (depending on how they are structured, current funding levels and authorities); or b) Would constitute a significant change to the policies underlying current market development approaches. Policy analysis determined that the options in this section would not require new legislation, provided these are defined and structured in accordance with current state statute. It is clear that funding assistance is a fundamental tool that impacts market dynamics, and it currently accounts for more than half of the total market development budget. It should be noted that some stakeholders have suggested that CalRecycle adopt policies to reduce export of waste tires. These were not included here because CalRecycle enforcement staff are currently conducting a review of export-related compliance issues.

The analysis is intended to provide a broad scan with transparent assumptions, sufficient to guide CalRecycle staff and management, as well as stakeholders, to draw their own conclusions regarding whether any of the options merit additional consideration or immediate implementation. While the evaluation is as quantitative and objective as possible, ultimately conclusions regarding the “best” policy approach are at least partly subjective and inherently political in nature. Therefore, rather than a rigid scoring of options, we aim to provide a compelling rationale for the options best suited to assist CalRecycle, given its goals, based on the following criteria:

- **Criterion #1—Likely Diversion Impact.** *Can the policy address priority market segments and key barriers? What is the range of expected increased diversion and how likely is it to occur in practice? Will it result in new diversion without shifting tons from current markets or applying state resources to activities that would occur anyway? Is the diversion likely to be sustainable, even if the policy is removed in the future?*
- **Criterion #2—Relative Costs and Stakeholder Impacts.** *How will current requirements and costs to CalRecycle, other state/local agencies, waste tire management firms, and tire manufacturers change, if at all?*

- **Criterion #3—Implementation Feasibility and Issues.** *Is the policy feasible to implement and can it be improved over time? Is legislation needed and if so, what types of support/opposition is likely to be voiced by key stakeholder groups? Is the policy fair and equitable to all market players (recognizing that the policy is intended to shift tires from landfill disposal to diversion)? Does the policy further CalRecycle’s goals and desired outcomes, and is it consistent with the guiding principles as described in Section 2?*

Table 6-1 summarizes the options evaluated, including a brief description, high-level pros and cons, and an overall recommended priority level. The priority levels are defined as follows:

- **High Priority**—CalRecycle should consider implementation in the short term. These options can be targeted to top-priority market expansion opportunities and barriers, have a high likelihood of succeeding in significantly increasing diversion levels at reasonably low cost-per-tire levels (compared to current program ranges) or have other compelling justifications.
- **Medium Priority**—CalRecycle should consider promoting these policy adjustments under certain conditions and/or should present them for stakeholder feedback as part of the next Five-Year Plan process, and, depending on the results, should seek legislation to implement them. These options have the potential to target top-priority expansion opportunities and barriers, and if implemented could significantly increase diversion levels, or have other compelling justifications. However, they may require additional analysis to confirm the best implementation approach and likely results, or embody fundamental changes to current policies that merit more in-depth review and stakeholder feedback.
- **Low Priority**—CalRecycle should not pursue these options at this time. These options have low diversion potential, high costs, negative implementation impacts, and/or may be infeasible or politically risky to propose at this time.

For historical context, following is a synopsis of a prior 2002 CalRecycle-funded report on policy options, along with a brief comparison to the approach used in this current report. The 2002 report was titled, *An Analysis of Subsidies and Other Options to Expand the Productive End Use of Scrap Tires in California*, prepared by Professor Robert W. Wassmer, California State University, Sacramento. This 2002 report evaluated six policy options: status quo activities; further regulation of landfill disposal (i.e., requiring processing to two-inch chips to incentivize diversion); per-tire subsidies to processors; per-tire subsidies to end-users; further subsidize capital purchases for processors (i.e., by increasing the amount allocated in 2002 to commercialization grants from \$4 million to \$8 million, and structuring the support initially as a loan that is converted to a grant when the new processing capacity is realized); per-mile, per-tire transportation subsidies (provided to haulers of whole tires, not processed material); and informational campaigns. The 2002 report used five criteria to evaluate the options: efficiency (i.e., bang for the buck); equity to industry players; sustainability (i.e. continued benefits even after the policy/program ends); political/legal feasibility; and administration costs/improvability. The report assigned numerical, relative weights to each criterion and then assigned a score between one and five to each option, for each criterion. One option (per-tire subsidy to processors) scored highest with a score of 3.35 of 5.00 possible points, three other options had scores of 3.25, and two options (further regulation of landfills and per-tire and per-mile subsidies) ranked lowest. These results did not yield clear recommendations, however, with the report concluding that “...four of the six policies were so close that their desirability...is virtually indistinguishable...” and “...what is beneficial about the process employed ...is that readers can clearly see the benefits and costs of each.”

This current policy evaluation shares the goal of providing a clear and transparent analysis to provide CalRecycle and stakeholders with a common base of information to reach their own conclusions. However, differences in approach are considerable. We analyze all of the options included in that study, but several more as well. We use three broad criteria to evaluate options that incorporate the five used in the previous study (plus additional considerations). And, rather than a quantitative ranking system, we focus on a qualitative evaluation aimed at providing a compelling, fact-based rationale for identified priority options and overall recommendations.

Following Table 6-1 below, the options are evaluated. Included is a definition of each option along with a description of current policies and precedents from other states or Canadian provinces. We also briefly summarize pros and cons related to the three criteria described above. Overall recommendations for pursuing policy changes are presented in Section 7 in terms of three broad scenarios: 1) Options that can complement current programs; 2) Options that could achieve the 90 percent diversion goal by 2015 and which may require adjustments to current programs; and 3) Options that would completely change the current waste tire management legislative framework in California.

**Table 6-1. Summary of Selected Programmatic and Policy Options and Recommended Priority Level**

Option	Key Pros	Key Cons	Overall Priority Level
<b>Funding Assistance (Do not require legislation, except aspects of 1.2 and 1.6)</b>			
<b>1.1 Supplier subsidies (ongoing payments)</b> Provides ongoing per-ton payments to all approved processors and/or TDP producers/installers based on documented sales to approved markets. Adapted from current e-waste program and several tire programs in other states/provinces.	<ul style="list-style-type: none"> <li>• Strengthens processor and/or TDP producer economics and competitive advantage with out-of-state firms.</li> <li>• Incentivizes sales to targeted markets.</li> </ul>	<ul style="list-style-type: none"> <li>• High cost (\$16- \$24 million in 2015 based on \$0.50 per tire, depending on coverage).</li> <li>• Need for new staff; program development.</li> <li>• Subsidizes already occurring activity.</li> <li>• Potential for fraud and/or fairness concerns/litigation.</li> <li>• No direct demand-pull element.</li> <li>• Fosters dependence on state support.</li> </ul>	<b>Low</b> Do not pursue.
<b>1.2 Consumer subsidies (rebates)</b> Reimburses specified TDP or TDA consumers based on submittal of documentation of specific purchases. Adapted from appliance and other energy-related rebate programs.	<ul style="list-style-type: none"> <li>• Direct demand-pull impact.</li> <li>• Can be targeted narrowly or broadly in many different ways.</li> <li>• Relatively low cost—can be capped at any annual budget level.</li> <li>• Equally fair to all supplier firms.</li> <li>• Can effectively send market signal to leverage/reinforce outreach and tech assistance.</li> <li>• May be best applied to provide lower subsidy than grants to more entities.</li> </ul>	<ul style="list-style-type: none"> <li>• Need for new staff assignments, program development.</li> <li>• New program targeting government agencies or private firms would require new regulations (but not legislation); A program targeting individual consumers and retail purchases would likely require new legislation.</li> <li>• Less leverage for reporting/case studies compared to grants.</li> <li>• Potential for fraud/need for compliance monitoring.</li> </ul>	<b>Medium</b> Consider pilot project targeting local/state agencies purchasing TDA for specified projects (not individual consumers); Possibly limit to transportation costs as in Option 1.3.
<b>1.3 Transportation subsidies (rebates)</b> Reimburses specified purchasers specifically for transportation costs based on a predetermined formula. Similar to Option 1.2 but more narrowly implemented.	<ul style="list-style-type: none"> <li>• Can target geographic gaps in suppliers of TDA and RAC.</li> <li>• Can be targeted to specified circumstances where most needed.</li> <li>• Relatively low cost—can be targeted narrowly or broadly to different product types.</li> </ul>	<ul style="list-style-type: none"> <li>• New program requires startup period and new regulations.</li> <li>• Potential for fraud/need for compliance monitoring.</li> </ul>	<b>Medium</b> Consider pilot project for TDA and/or RAC supply to remote regions with possible expansion to other specific products and circumstances.
<b>1.4 Supplier grants</b> Provides grant funding to processors and/or TDP producers/installers. Adapted from the discontinued Commercialization Grant Program, but may be targeted more narrowly to specific needs.	<ul style="list-style-type: none"> <li>• Can enhance economic vitality of processors and TDP producers/installers.</li> <li>• Can be targeted to specific infrastructure gaps.</li> </ul>	<ul style="list-style-type: none"> <li>• No direct demand-pull element.</li> <li>• Potential to trigger market disruption (e.g., glut in marketplace); Concerns over fairness and equity.</li> <li>• Supply infrastructure already well developed generally.</li> </ul>	<b>Low</b> Do not pursue at this time; However, consider targeted grants in future if specific infrastructure gaps are identified to meet market demand.



Option	Key Pros	Key Cons	Overall Priority Level
<b>1.5 Consumer grants (current program)</b> Provides grant funding to specified TDA or TDP consumers. Modeled on current RAC and TDP grant program, with continued targeting/adjustments to maximize benefits.	<ul style="list-style-type: none"> <li>Provides direct demand-pull impact.</li> <li>Can be targeted flexibly as goals and market conditions change.</li> <li>Provides leverage for gathering TDP performance and cost data.</li> </ul>	<ul style="list-style-type: none"> <li>Unclear when grants result in new demand or catalyze long-term demand, versus short-term subsidies.</li> <li>Fosters dependence on state.</li> <li>Relatively high cost per tire.</li> </ul>	<b>High</b> Continue to adjust grants to target top priorities and reduce cost per tire; Consider shifting some funds to rebate and innovations grant model.
<b>1.6 Innovations grant program</b> Provides grant funds based on performance objectives rather than specific activities pre-defined by CalRecycle. Examples: new product research and commercialization; public-private partnerships, equity partnerships or technology license agreements; proactive proposals by public and private applicants to achieve CalRecycle goals.	<ul style="list-style-type: none"> <li>Provides maximum flexibility in targeting objectives and using alternative funding structures.</li> <li>Leverages private-sector resources and positioning.</li> <li>Catalyzes industry's entrepreneurial potential.</li> <li>Low risk for pilot program—state invests only when highly desirable projects are identified.</li> </ul>	<ul style="list-style-type: none"> <li>Need for new regulations, program development.</li> <li>Less strictly defined eligible products results in more subjective scoring and potential for disputes with applicants.</li> <li>Certain specific elements may require legislation to incorporate (e.g., equity partnerships, license agreements).</li> </ul>	<b>High</b> Pilot program with a modest funding allocation.
<b>1.7 Supplier loans (Current Program)</b> Provides low-interest loans to processors and TDP producers/installers, but may be targeted to meet priority needs.	<ul style="list-style-type: none"> <li>Can strengthen vitality of processors and TDP producers/installers.</li> <li>Requires due diligence to confirm businesses' soundness.</li> <li>Can be targeted to specific needs and to reduce market disruption potential.</li> <li>Low net cost—Leverages state funds well.</li> </ul>	<ul style="list-style-type: none"> <li>Can potentially lead to market disruptions if supply greatly exceeds demand due to state investment.</li> </ul>	<b>High</b> Continue program, with evaluation of broad infrastructure and market need for proposed projects, including evaluation of potential risks of a supply glut situation.
<b>Adjust State Fees and Market Development Funding Levels (All require legislation)</b>			
<b>2.1 Increase current tire retail fee amount or portion allocated to CalRecycle</b> Would adjust current fee system to increase CalRecycle funding for market development.	<ul style="list-style-type: none"> <li>Increases funding without need for new administrative staff or costs.</li> </ul>	<ul style="list-style-type: none"> <li>Would likely be opposed by tire dealers and/or anti-tax groups.</li> <li>Current political and state budget environment makes implementation highly unlikely and politically risky.</li> </ul>	<b>Low</b> Do not pursue at this time.
<b>2.2 Reduce the current tire retail fee amount</b> Would reduce or eliminate the current fee and funding available for state programs (included for completeness—not a market development strategy).	<ul style="list-style-type: none"> <li>Reduces costs to tire consumers and administrative burden on tire dealers and state agencies.</li> </ul>	<ul style="list-style-type: none"> <li>Would reduce or eliminate CalRecycle market development and other tire programs, which would jeopardize continued diversion and possibly proper tire disposal needed to avoid stockpiles.</li> </ul>	<b>Low</b> Do not pursue.

Option	Key Pros	Key Cons	Overall Priority Level
<b>2.3 Adopt a new tire disposal tip fee</b> Would enact a new per-ton or per-tire fee on the disposal of tires at landfills.	<ul style="list-style-type: none"> <li>Provides a disincentive to dispose tires and a new funding source for market development programs.</li> <li>Administration can "piggy back" on existing AB 939 landfill fee.</li> </ul>	<ul style="list-style-type: none"> <li>Would add a cost to processors and haulers (and waste tire generators) when no economic alternative to disposal exists.</li> <li>Would be perceived as a double dip – charging twice for tire management (in addition to retail fee).</li> <li>Highly unlikely to be feasible to implement and is politically risky.</li> </ul>	<b>Low</b> Do not pursue.
<b>Use Mandates (All require legislation)</b>			
<b>3.1 Strengthen and expand current state TDP purchase price preferences</b> Would expand current DGS-focused legislation to require that specified state and/or local agencies provide a purchase price preference for specified TDA/TDPs.	<ul style="list-style-type: none"> <li>Direct demand-pull impact.</li> <li>Leverages potential government purchasing power and other supporting programs (especially rebates under #1.2 above).</li> <li>Fair and equitable to all supplier firms.</li> <li>Low cost to CalRecycle (unless directly tied to rebates to cover agency costs or implemented in conjunction with expanded grant programs).</li> </ul>	<ul style="list-style-type: none"> <li>Requires legislation and some will oppose due to potential for added agency costs.</li> <li>Poor history of effectiveness with current DGS price preference.</li> <li>Requires supporting education, technical assistance and (ideally) funding assistance.</li> </ul>	<b>Medium</b> Evaluate further by soliciting stakeholder and agency feedback on options for strengthening current procurement and price preference legislation and extending it to cover local agencies. Further explore relative merits of strengthening purchase/price preferences vs. use mandates (as in option 3.2).
<b>3.2 Mandate TDA/TDP use by local/state agencies</b> Would require specified local/state agencies to purchase TDA or TDPs under specified circumstances.	<ul style="list-style-type: none"> <li>Direct demand-pull impact.</li> <li>Low cost to CalRecycle.</li> <li>Fair and equitable to all supplier firms.</li> <li>May lend itself most to extending Caltrans RAC requirement to local agencies.</li> </ul>	<ul style="list-style-type: none"> <li>Requires legislation and some will oppose due to potential for added agency costs Few products may be well-positioned for required use.</li> <li>TDA applications vary and may not lend themselves to a broad mandate.</li> <li>Mandating use may trigger negative perception of TDPs.</li> <li>Requires compliance monitoring and enforcement.</li> </ul>	<b>Medium</b> Evaluate further by soliciting stakeholder feedback and investigating whether key concerns can be addressed. Further explore relative merits of strengthening purchase/price preferences (as in option 3.1) vs. use mandates.
<b>3.3 Require CA rubber in current Caltrans RAC mandate</b> Would require Caltrans to use exclusively California-generated tire rubber for current RAC use mandate.	<ul style="list-style-type: none"> <li>Administratively, requires only a small adjustment to an existing policy.</li> <li>Very likely to have a significant impact on diversion in a high value, established market.</li> <li>Low cost to CalRecycle.</li> </ul>	<ul style="list-style-type: none"> <li>Requires legislation and some will oppose due to possible additional cost to Caltrans.</li> <li>May not be legal due to interstate commerce clause.</li> </ul>	<b>Medium</b> Confirm whether this is precluded by federal interstate commerce clause and pursue if appropriate.

Option	Key Pros	Key Cons	Overall Priority Level
<b>Extended Producer Responsibility Mandates (Requires legislation)</b>			
<b>4.1 Adopt an Extended Producer Responsibility Mandate</b> Would require tire manufacturers to achieve specified goals and would define new roles/funding for government agencies.	<ul style="list-style-type: none"> <li>Greatly reduces state costs and staffing needs.</li> <li>Provides incentive for manufacturer design for recycling considerations.</li> <li>Privatizes system, providing greater flexibility and market-based efficiencies.</li> <li>May provide funding for local agencies (depending on details).</li> <li>May decrease net cost burden on tire consumers and tire dealers.</li> </ul>	<ul style="list-style-type: none"> <li>Requires major legislative proposal, likely a multi-year process.</li> <li>Greatly reduces ability of state to control directions/approaches.</li> <li>May lead to less desirable markets and disposal options.</li> <li>May lead to less competitive processor industry in the long-term—likely to see “winners” and “losers” in hauling and processing industry.</li> </ul>	<b>Medium</b> Investigate potential structure and impacts in more detail, and solicit stakeholder perspectives.
<b>Other Policy Options (Require legislation, except 5.5)</b>			
<b>5.1 Ban on tire landfill disposal</b> Would ban all tire disposal in California landfills at a specified future date (e.g., 2015) subject to determination that market demand exceeds supply.	<ul style="list-style-type: none"> <li>Helps catalyze market development by clearly stating state's intent to develop markets sufficiently to phase out tire landfill disposal.</li> <li>Requiring a determination that demand exceeds supply addresses concern over illegal disposal.</li> <li>Can allow for exemptions for specified reasons (e.g., low demand in remote regions, disruptions in recycling demand statewide, or large or degraded tires not suitable for processing).</li> </ul>	<ul style="list-style-type: none"> <li>Requires legislation – likely opposition from many in tire management industry.</li> <li>Potential for increased costs to generators, haulers, processors.</li> <li>Some potential for market disruption and illegal disposal, especially if market conditions change abruptly.</li> <li>Need for enhanced manifest tracking to aid in enforcement.</li> </ul>	<b>Medium</b> Consider adoption in short term, but with the ban being phased in over 4-5 years; along with a new zero waste tire goal replacing the current 90 percent diversion goal.
<b>5.2 Secure legislative authority to promote TDF</b> Would remove the current ban on CalRecycle support for tire-derived fuel.	<ul style="list-style-type: none"> <li>Would eliminate restriction on maintaining the current high-value, high-volume market (currently 7.5 million PTE with potential of 15-20 million PTE).</li> <li>Would allow CalRecycle to comment on proposed federal rules that could jeopardize up to 5.4 million PTE of current TDF demand in California with associated cost increases to generators, haulers, processors and cement producers.</li> </ul>	<ul style="list-style-type: none"> <li>Requires legislation. Likely to face opposition from certain environmental organizations.</li> </ul>	<b>High</b> Pursue in short term.

Option	Key Pros	Key Cons	Overall Priority Level
<b>5.3 Seek recognition of TDF as a renewable fuel under RPS standard</b> Would adjust current state policy to allow TDF to "count" towards mandated renewable use by electric utilities.	<ul style="list-style-type: none"> <li>Provides an incentive for existing boilers/electricity generators and potential new facilities to select tires as fuel, creating new demand.</li> </ul>	<ul style="list-style-type: none"> <li>Requires legislation and/or regulatory adjustment outside of CalRecycle control and purview.</li> <li>Strong political opposition to including tires as it may dilute impact of current mandate.</li> <li>"Slippery slope" could promote similar change for all WTE facilities.</li> <li>Would compete with other "green" fuels such as biomass.</li> </ul>	<p><b>Low</b> Do not pursue.</p>
<b>5.4 State operation of facilities/Seek ownership of tire monofills</b> CalRecycle would gain authority to operate certain facilities (e.g., TDA supply depots) and/or to negotiate or regulate closure of the Azusa tire monofill.	<ul style="list-style-type: none"> <li>Could fundamentally improve economics of diversion in Southern California.</li> <li>Could provide new options for CalRecycle in acting as a market participant and influencing economics and storage/TDA supply solutions.</li> </ul>	<ul style="list-style-type: none"> <li>Requires legislation for authority.</li> <li>Uncertain costs and feasibility.</li> <li>New program for CalRecycle requires new expertise not currently available.</li> </ul>	<p><b>Low</b> Do not pursue at this time.</p>
<b>5.5 Seek regulatory changes to allow TDA use in septic systems</b> CalRecycle would work with the SWRCB and/or county agencies to adjust current regulations.	<ul style="list-style-type: none"> <li>Could open up a value-added market as large as 4-8 million PTE per year that is already well-established and proven in some other states.</li> <li>Low cost to CalRecycle to promote the change.</li> </ul>	<ul style="list-style-type: none"> <li>Concern by SWRCB regarding septic systems generally and TDA in particular.</li> <li>Counties unlikely to take action without SWRCB action first.</li> </ul>	<p><b>High</b> Provide direct request to SWRCB and maintain dialog on options; Consider additional demonstration projects.</p>

## ***Funding Assistance Options***

### **Overview**

This overview addresses two key issues relevant to all funding assistance policies – the need to design them to achieve goals while avoiding some central concerns, and the current legislative authority currently provided to CalRecycle to implement them. Following the overview, the seven funding policy options listed in Table 6-1 above are evaluated:

### ***Approaches to Achieving Funding Assistance Goals While Avoiding Pitfalls***

Central concerns regarding funding assistance include: the potential for funding to be provided where it is not needed; to inadvertently support shifting of diversion from one market to another; and/or to perpetuate conditions under which some firms or market segments become dependent upon state support for their survival. A further issue related to subsidies specifically is how payment amounts should be determined. There are at least three options:

- Set payments to cover net costs for specific activities (e.g., producing TDA for specified markets);
- Set payments to cover selected costs only (e.g., transportation); and/or
- Set payments at a level that will provide the needed incentive to catalyze certain behavior (e.g., providing payments in excess of net costs specifically to encourage shifts in production).

Each of these options for determining funding levels is problematic in different ways. In practice, market players have vastly different costs, and a policy designed to cover unmet costs also has the effect of subsidizing inefficient practices and possibly leading to a dependency on the state for survival. Because all market players experience different costs, any price support will necessarily have some “winners” who gain competitive advantage and some “losers” whose competitive positioning is reduced.

As discussed in Section 4 on page 48, it is impossible to definitively and objectively address the above concerns related to funding assistance due to a lack of data about prices, costs, and other market supply and demand factors. CalRecycle survey results suggest that grantees often intend to continue purchasing TDPs without state support. Expanded performance measurement (as discussed in recommendations #4 and #13 in Section 7) can help determine how funding has influenced recipient behavior after the grant period, and research can help identify TDP categories that are “well established” and less in need of funding assistance to catalyze sales (as discussed under recommendation #6 in Section 7). However, market dynamics still vary based on a variety of local conditions and with broad economic trends over time, making definitive conclusions about funding program impacts subject to inherent uncertainty.

Notwithstanding these challenges, following are some general approaches that can be used to help ensure that funding assistance is delivered in a manner that will minimize disruptions and perverse incentives, while maximizing desired effects:

- Favor support to product consumers (e.g., government agencies, private-sector firms) over suppliers (e.g., waste tire processors and TDP producers/installers);

- Target assistance narrowly and strategically to address specific product barriers (recognizing that overly nuanced programs also can be more expensive to implement);
- Provide the lowest amount of funding needed to achieve the desired goal;
- Periodically evaluate the continued need for each funding assistance program; and/or
- Design programs so that they can be adjusted over time as lessons are learned and market conditions change.

These approaches are embedded in the analysis and recommendations that follow.

### ***Current Statutory Authority and Implementation Issues***

CalRecycle currently has rather broad statutory authority to implement funding assistance programs, as described in the following excerpt (PRC 42872 a):

“The tire recycling program may include, but is not limited to, the following:

- (a) The awarding of grants, subsidies, and loans to businesses or other enterprises, and public entities, involved in activities and applications that result in reduced landfill disposal of used whole tires and reduced illegal disposal or stockpiling of used whole tires.
- (b) The awarding of grants for research aimed at developing technologies or improving current activities and applications that result in reduced landfill disposal of used whole tires.
- (c) The awarding of grants or loans for the evaluation, planning, design, improvement, and implementation of alternative used tire recycling programs in this state.
- (d) The awarding of grants or loans to businesses which shred used tires for purposes of recycling.
- (e) Development and implementation of an information and education program, including seminars and conferences, aimed at promoting alternatives to the landfill disposal of used whole tires.
- (f) The awarding of grants or loans to tire shredding programs at authorized landfills, solid waste transfer stations, or dedicated tire shredding facilities, including the direct purchase of shredders or financing of shredder contracts.”

According to the CalRecycle Legal Office, this language is very broad and it appears that the optional funding proposals evaluated in this section would not require new legislation to implement<sup>§</sup>, with very few exceptions (e.g., targeting subsidies to individual consumers under Option 1.2 or alternative elements that could be incorporated into the innovation grants under Option 1.6, such as licensing agreements or equity partnerships in which CalRecycle may generate revenue).

Generally, to be authorized under current statute, policies must be targeted to businesses or other enterprises and public entities (not individual consumers since they are not listed in statute) and show a direct, documentable link to “resulting in reduced landfill disposal of used whole tires...” That is, there should be a quantifiable number of tires associated with any funding assistance provided that is reportable. While CalRecycle has the authority to set narrow or broad criteria for

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<sup>§</sup> In addition to the broad authority under PRC 42872 cited above, specific legislative authority for the current RAC grant program is provided under PRC 42872.5, which sunsets on June 30, 2010. While it appears that authority for this program is still valid under the prior legislation, CalRecycle attorneys are investigating this matter.

funding programs, there is a need to demonstrate fair and objective scoring and approvals, so criteria shouldn't be too nuanced or subjective.

Finally, while legislative authority is quite broad, most new programs under this authority would likely require new regulations to implement. Depending on the program particulars and cost, the regulations could attract significant stakeholder participation and lead to a complex, costly, and time-consuming rule making process.

## 1.1 Supplier Subsidies (Ongoing Payments)

**Definition and Precedents:** Supplier subsidies provide a per-ton (or per-tire) payment to processors and/or TDP producers/installers in order to strengthen their economic vitality and provide an incentive for developing infrastructure and moving waste tires into specific end markets. This is similar to California's Covered Electronic Devices Payment System which covers the net cost of e-waste collection and recycling by providing a per-pound payment to processors and collectors. Such programs have been implemented for tires in several states in the past, including Texas, Oregon, and Wisconsin (where they were focused largely on cleanup of stockpiles and are no longer in effect)<sup>\*\*</sup> and Virginia, Utah, and Oklahoma (where they target annually generated waste tires and are still in effect).<sup>††</sup> Similar payments are also made under the product stewardship programs operated in several Canadian provinces including British Columbia, Alberta, and Ontario.

The programs generally reimburse firms after waste tires have been processed into ground rubber, TDA, or TDF, and require documentation that the material has been sold to an approved end user. Reportedly, some early programs did not contain such provisions and exacerbated market challenges by resulting in stockpiled, processed waste tires. In Utah, payments are made to ground rubber producers, but proof of shipment to a consumer is also required. In Virginia, payments are made to "end users" such as landfills using tires in civil engineering applications (broadly defined), facilities that consume TDF as fuel, and to private sector firms involved in installation of septic systems. Virginia does not have ground rubber producers in the state.

**Diversion Potential:** Supplier subsidies do not provide a demand-pull element and are limited to incentivizing the processing of waste tires into ground rubber, TDA or other materials, and/or the production of TDPs or use of TDF. The total amount of tires covered under a program depends on the terms ultimately employed. A program covering all processing of ground rubber and TDA, for example, would initially be targeting about 13 million PTE of waste tires (i.e., the amount currently processed and used in ground rubber and TDA without any subsidy provided) and could range as high as 26 million PTE in 2015 according to one scenario for achieving the 90 percent diversion goal. (Alternative scenarios and cost estimate assumptions are provided in Appendix G.) A broader program that provided payments to processors for all material not landfilled could cover as much as 47 million PTE in 2015. However, much of the material "paid for" under this program would have been processed anyway. Some states and provinces with strong supplier subsidies tend to rely on external markets for ground rubber produced under their system. While California producers should continue to expand marketing and sales nationwide to the extent possible, the potential negative impact of a subsidy program in California on national markets could far outweigh the negative impacts experienced to date in California from other relatively

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<sup>\*\*</sup> Michael Blumenthal, Rubber Manufacturers Association.

<sup>††</sup> 2010 Scrap Tire & News Users Directory



small population states and provinces. That is, some California firms have complained that some out-of-state firms who are subsidized have an unfair competitive advantage. While applying such a subsidy to California producers may alleviate this and facilitate expansion of sales in other states, it could have a disproportionate impact on firms in other states, given the large amount of California's ground rubber production.

**Relative Costs and Stakeholder Issues:** Payment rates vary significantly. In Utah processors of ground rubber receive \$65 per ton, end users of waste tires such as cement plants receive \$50 per ton and users of waste tires for beneficial use applications receive \$20 per ton. In Virginia, payment rates range from \$22.50 per ton to \$50 per ton. In Ontario, payment rates are much higher and are explicitly set by Ontario Tire Stewardship (an industry organization) at a level intended to drive market transformation as listed in Table 6-2. This is an aggressive program that provides payments throughout the recycling value chain (payment rates are summarized in Table 6-2. Note that we have not converted Canadian dollars to U.S. dollars, which were trading at about 1.2 Canadian dollars per U.S. dollar when these rates were developed.) Some analysts have observed that comparing Canadian to U.S. costs without conversions is roughly accurate due to inherent cost differences in Canada.)

**Table 6-2. Ontario Tire Stewardship Payment Rates (Total Tire Generation = 12.2 Million PTEs)**

Activity	Payment Based on Whole Tire Inputs (\$ Canadian)	Payment Based on Processed Tire Outputs	Initial Annual Budget
Hauling	C\$0.88 – C\$3.05 per tire depending on size	NA	C\$10.5 million
Transportation (Average Costs)	C\$170/ton	NA	C\$26.0 million
Processing			
Minus 20 Mesh	C\$175/ton	C\$270/ton	C\$18.8 million for ground rubber production (all 3 sizes)
Minus 80 Mesh	C\$150/ton	C\$230/ton	
Minus ¼ Inch Sieve	C\$100/ton	C\$155/ton	
Fabricated Products	C\$65/ton	C\$65/ton	C\$0.8 million
Primary Shred	C\$55/ton	C\$55/ton	C\$2.3 million
Manufacturers	NA	C\$160/ton	\$1.6 million

Source: Ontario Tire Stewardship

The 2002 CalRecycle policy evaluation study (summarized on the second page of this chapter) proposed a rate of \$0.17 per PTE or \$17 per ton on the basis that this approximates the difference in cost between landfill disposal and the next least costly market option in Southern California at that time. However, even a relatively low rate and narrowly targeted program can lead to high costs. For example, at a rate of \$0.20 per tire (\$20 per ton) and including only processed ground rubber and TDA, annual costs between now and 2015 (assuming the 90 percent goal were met) could range from about \$2.6 million to \$5.1 million (excluding administrative costs). At a rate



more likely to provide an effective incentive, say \$0.50 per tire or \$50 per ton, total costs could range from \$6.4 million to \$12.8 million. Extending the \$0.50 per tire subsidy to all tires not disposed would increase the range to \$16.3 million to \$23.7 million.

**Implementation Process and Feasibility:** While CalRecycle could potentially implement a supplier subsidy program under current legislative authority, it would require complex regulations that would likely attract a significant amount of attention from many different stakeholders. While many processors would be likely to strongly support it, others may not because the program would likely support certain markets (i.e., ground rubber and TDA) over others (i.e., ADC or export), especially because current legislation would not allow it to support TDF markets.

If adopted, the program would require complex regulations similar to those used to implement the e-waste cost reimbursement program, along with several new staff.

**Ranking and Rationale:** Low priority—Do not pursue. Supplier subsidies are generally inefficient in that they subsidize a large amount of activity that is currently happening anyway. It imposes a high cost without providing any direct demand-pull market development element. It would raise concerns over equity and program complexity and, as a result of all these factors, may not be feasible to implement due to the need for legislation that would, by nature, pit different stakeholder interests against each other.

## 1.2 Consumer Subsidies (Rebates)

**Definition and Precedents:** Consumer subsidies are similar to the supplier subsidies covered under Option #1.1 except that payments are made to purchasers, which may include: a) Local or state agencies; b) Private firms such as engineering firms, developers, landscapers, road construction firms; or c) Individual consumers purchasing TDPs at retail outlets. However, because many consumers are likely to be only occasional purchasers of targeted TDPs or TDA material, such a payment system would have to be very streamlined and able to accommodate a much larger number of participating entities who may participate only occasionally and irregularly. The rebate model considered here would resemble that used for the California Cash for Appliances rebate program which reimburses consumers for purchasing new energy-conserving appliances and returning old ones for recycling, or the California Go Solar Rebate Program which has programs for reimbursing both homeowners purchasing solar energy systems and builders that would likely purchase multiple systems. After purchasing covered products, consumers would submit documentation to CalRecycle and, after approval, would receive a check. The program can also include a system for locking in one's rebate prior to purchase through an initial added "reservation of funds" step, which could be critical for any activities that require prior planning.

In contrast to grants, a rebate program would probably lend itself best to situations where CalRecycle desires to offer a relatively small subsidy to a relatively large number of entities. It also may be useful for helping to generate a "buzz" that the state is prepared to broadly support projects in a certain market segment. While grants require consumers to prepare an application, and to compete with other applicants, the rebate model is intended to be very simple and quick, with applicants locking in their rebate via a quick application which is not finalized until they submit documentation after purchasing (and installing, as appropriate) the product. CalRecycle would accept all applications up to the point that budgeted funds are exhausted. If some applicants do not follow through on intended purchases by a specified date, then funds reserved for them would be returned to the pool for availability to other purchasers. Another contrast with

grants is that the rebate program probably would not provide as much data on cost and performance (since the intention is for it to be a simple-to-use program), although applicants could be required to participate in case studies with a small number selected each year, or in annual reporting for several years, as is required in the Go Solar program.

For the purposes of this evaluation, we focus on two possible initial program deployments: a program targeting local and state agency use of TDA, and a program targeting individual consumer purchase of TDPs such as rubber mulch, pavers, and mats sold in retail establishments. The program could also adapt well to local agency RAC purchases and/or purchase/use of a wide variety of TDPs or TDA by private-sector entities.

**Diversion Impact:** If the program targets TDA purchased by local and state agencies we estimate it would cover initially 2.8 million PTEs, and that this could grow to as high as 6.5 million PTEs in the 90 percent diversion scenario used in this analysis. Assuming the program provided a meaningful incentive (\$20 per ton is assumed here) and was combined with technical assistance and outreach and promotion, we assume that a high percentage of growth could reasonably be attributed to the program.

For a retail program targeting molded products, rubber mulch and loose-fill playground material, we assume that in 2008 15 percent of California production is sold in retail stores and that this percentage increases to 40 percent in 2015, based on a 90 percent diversion scenario presented in Appendix G, resulting in the sale of 0.6 million PTEs to 1.6 million PTEs in 2015. Although the program can be implemented without involvement by retailers, to have a significant impact on sales such a program would need to be well-marketed, including point-of-sale promotions, which would require broad participation from one or more major retailers. While TDPs currently sold in retail stores are already reaping the benefits of sophisticated marketing resources, it is difficult to predict the impact on sales that a rebate program could offer. California's Cash for Appliances program, for example, relies on retailers to provide education, outreach, and promotion regarding the program, as well as the products promoted by the program.

**Relative Stakeholder Impacts and Cost Considerations:** The TDA rebate program described above, if providing \$0.20 per PTE (\$20 per ton), would result in a cost of \$560,000 to \$1.3 million. The individual retail consumer rebate program, based on a rate of \$2.50 per PTE (\$250 per ton) would result in a cost of \$600,000 initially, and could rise as high as \$4.6 million. These estimates are based on the assumptions provided in Appendix G and are subject to uncertainty. However, this simple analysis indicates that a program narrowly targeted to TDA could have relatively modest costs while a broader program targeting individual consumers could have relatively high costs. However, an advantage of the rebate model is that a specific budget can be set in advance on a not-to-exceed basis. Additional CalRecycle costs would be incurred for staffing to set up and administer the program, including developing regulations. Also, administrative costs will be proportional to the number of entities requesting reimbursement, potentially driving the cost of a retail rebate program (targeting individual consumers) quite high.

**Implementation Process and Issues:** CalRecycle legal counsel has indicated that a rebate program targeting government agencies or private firms is allowable under current statutory authority. However, a program targeting individual consumers may require new legislation, since they are not listed as a possible recipient in current statute, as quoted earlier in this section. Any new rebate program will require regulations. Other implementation considerations include the need for staff to develop regulations and develop and implement the program. Administrative needs include payment review and processing, fund management, monitoring compliance and auditing applications to identify fraud, and enforcement activities. To be successful a rebate

program needs to be conducted in tandem with outreach and promotion, and ideally technical assistance in the case of TDA and RAC. In the case of retailer rebates, the program will be most successful if jointly promoted in partnership with one or more major retailers, resulting in costs to develop and maintain such a partnership, but also potentially significant benefits. Another drawback to the retailer model is the need to document the source of products sold, which would require involvement by the retailer. In the case of TDA or RAC projects, this is still required but CalRecycle would be well-positioned to document whether the projects being undertaken and the specific sources of material are acceptable. In the Go Solar and Cash for Appliance programs, for example, installers/retailers must register with the program to be eligible.

**Ranking and Rationale:** Medium priority—Consider a pilot program targeting TDA purchase by local and state agencies and/or another narrowly defined product group to demonstrate the approach and document relative advantages and disadvantages compared to grants and the transportation rebate model described next. Also, consider application of rebates as a means of compensating local and/or state agencies that may be subject to purchasing tire-derived products if price preferences or use mandates, as discussed under Options 3.1 and 3.2 below, are implemented.

### 1.3 Transportation Subsidies (Rebate Model)

**Definition and Precedents:** This option is similar to the TDP consumer rebates discussed under Option #1.2 above, but would be more narrowly targeted to provide a per-ton payment offsetting the high cost of shipping TDA (or other products such as ground rubber for use in RAC projects) to remote regions. CalRecycle would develop terms and conditions including identification of regions or transportation distances that qualify. Eligible recipients may include: a) Private processors; b) Local or state agencies leading projects and purchasing TDA; or c) Private firms leading projects and purchasing TDA.

CalRecycle's 2002 policy evaluation report included a transportation rebate option, but it was focused on subsidies for shipment of whole tires to processors for recycling, as an incentive to keep tires out of landfills, and suggested that the waste tire manifest system be updated to serve as a compliance monitoring device and to guard against fraud. Because that whole tire transportation model does not provide a direct demand-pull market development element, and also because considerable work would need to be done in order to use the manifest system for such a purpose (and it would still be dependent on user information, thus the potential for fraud would still exist) we focus only on a narrowly targeted program here, with the expectation that CalRecycle would pilot a program prior to fully launching it, if determined to be merited.

**Diversion Impact:** The transportation rebate is intended to provide a modest incentive to use TDA, RAC, or potentially other ground rubber feedstocks where transportation distance/cost is a barrier. Until awareness of the cost and performance benefits of targeted products is more widespread, it may make sense to use a somewhat higher rebate to provide a stronger incentive as discussed under the broader consumer rebates in Option 1.2 above. For the sake of illustration, we consider a transportation rebate program that covers use of TDA in civil engineering projects and RAC, providing a transportation subsidy of \$0.11 per tire per 100 miles for distances over 200 miles, and we further assume that 50 percent of TDA projects qualify and that 20 percent of RAC projects qualify. The base transportation rate is based on actual shipments of ground rubber 300 miles in 2,000 pound super sacks, shipped in quantities of 22 bags on a flatbed truck. While actual transportation costs can vary tremendously, this amount is similar to a rate of \$0.08 per tire per 100 miles used in the 2002 CalRecycle policy evaluation.

Based on the above assumptions, the program could cover approximately 1.4 million to 3.3 million PTE used for TDA civil engineering projects and approximately 0.9 to 1.4 million PTE used to make ground rubber and shipped to remote RAC projects. These estimates are based on current and projected 90 percent diversion scenario tonnages as presented in Appendix G, and do not necessarily represent estimates of new diversion to be achieved under the program.

**Relative Stakeholder Impacts and Cost Considerations:** Based on the assumptions above, the program would incur costs of \$616,000 to \$1.4 million for TDA and \$378,000 to \$616,000 for RAC, or a total of \$994,000 to \$2.5 million in 2015.

**Implementation Process and Issues:** As with the consumer rebate program described in Option 1.2, the program can be implemented under current legislative authority; however, CalRecycle would need to develop new regulations and would also need to develop the program from scratch. Administrative costs include processing claims, fund management, compliance monitoring, and reporting and enforcement. As a new and unproven program, CalRecycle should begin by piloting the program to better understand its application and how it can be streamlined.

**Ranking and Rationale:** Medium priority—Consider implementing a pilot program targeting TDA and/or RAC instead of, or in addition to, a new consumer rebate program or TDA consumer grant program as described under Options 1.2 and 1.5, respectively. The programs each have unique pros and cons and developing a rebate approach, while requiring start-up costs and time, would provide additional flexibility to achieve goals in the most efficient manner possible.

## 1.4 Supplier Grants

**Definition and Precedents:** This policy would provide grant funding similar to the discontinued Commercialization Grant Program, except that eligible projects and equipment types would be narrowly targeted to address specific market development needs and CalRecycle would require grantees to demonstrate a clear market need and address any identified concerns over potential market disruptions associated with the proposed projects. These elements are similar to the current Tire Equipment Loan Program described under Option #1.7 below, including recommended adjustments.

**Diversification Impact:** For illustrative purposes we present here the same statistics presented for supplier loans under Option #1.7. Based on statistics from four recent Tire Equipment Program Loans, shifting loan program funding of an average annual level of \$2.4 million as in the current Five-Year Plan to grants could yield about 1.2 to 6.1 million PTE per year of capacity, which constitutes about 3 to 12 percent of total tire generation. Because this is processing or TDP production capacity and not actual diversion, CalRecycle should be cautious about investing too heavily in expanded capacity too soon, as discussed elsewhere in this report.

**Relative Stakeholder Impacts and Cost Considerations:** In contrast to the Tire Equipment Loan Program's inherent efficiency, the grant program represents a direct expenditure and historically has not required the same level of due diligence on CalRecycle's part to ensure that the firm is credit worthy and is pursuing a viable project. Such due diligence could potentially be added to any future supplier grant program, but would mark a departure from past practices.

**Implementation Feasibility and Issues:** This option does not require legislation or regulations, and CalRecycle already has experience implementing the program. The program would be highly supported by many firms in the tire recycling value chain, although some processors have indicated that they do not support state grants on philosophical grounds and because of concerns

over inevitable market disruptions. One option, as discussed under Option #1.7, is to offer firms the possibility of having their loans converted to a grant under specified circumstances.

**Ranking and Rationale:** Low priority—Do not pursue. The Tire Equipment Loan Program has proven to be a cost-effective and efficient mechanism under relatively high demand for a new program, and is therefore better suited to meeting any need for state support for processors or TDP producers. However, if urgent supply side infrastructure needs arise in the future, this is a viable option to quickly promote development of the needed infrastructure.

## 1.5 Consumer Grants

**Definition and Precedents:** The current RAC, chip seal, and TDP grant programs operated by CalRecycle are consumer grant programs, and were evaluated in Section 4 along with other funding assistance programs. They are also included in this section to provide a side-by-side comparison with the potential new funding mechanisms, along with other policies and programs evaluated in this section.

Under consumer grants, CalRecycle currently offers grant funding to local agencies to cover a portion of the costs of purchasing specified products. The program currently includes a Targeted RAC Incentive grant program for first-time users of RAC (eligible applicants are limited to those that have received up to three RAC grants in the past, however the rate of reimbursement declines with successive grant awards), a Chip Seal program, and a TDP grant program covering many different types of products. CalRecycle has broad legislative authority to offer grants to local agencies and private entities. However, a fourth program, the RAC Use Grants, intended to provide a lower reimbursement rate for communities that have been awarded more than three RAC grants in the past, is specifically covered under separate legislative language that sunsets in June 2010, and CalRecycle legal counsel is currently reviewing the implications for that program. The programs could potentially be offered to private sector consumers and/or be applied to other products.

**Diversion Impact:** The current grant programs are in high demand and, as summarized in Table 4-4 earlier in this report, yield average annual diversion based on applications for the targeted RAC grant program of 0.3 to 0.4 million PTE, for the Chip Seal program of about 0.2 million PTE, and for the TDP grant program of 0.6 to 0.7 million PTE. As discussed at the beginning of this funding subsection, it is not possible at this time to determine exactly what portion of this “diversion” would have occurred without the grant programs, or what portion may be catalyzed by CalRecycle’s investment into self-sustaining market demand beyond the grant programs. However, the programs do represent a noteworthy volume of sales, with the 2008/09 RAC use grant applications reflecting a proposed volume equal to about 20 percent of the volume of waste tires consumed by Caltrans in RAC projects in 2008, for example.

**Relative Stakeholder Impacts and Cost Considerations:** Again, as shown in Appendix G, the above diversion estimates are based on the average budget allocated to each grant program in the current Five-Year Plan, or \$3.4 million for the Targeted RAC grant program, \$1.9 million for the Chip Seal Grant Program, and \$2.8 million for the TDP grant program, for a total of \$8.1 million.

**Implementation Process and Issues:** After many years of program evolution, CalRecycle has developed an experienced grant administrative team and has steadily adjusted programs in an effort to maximize effectiveness and target the program to high-priority opportunities. A range of implementation options and recommendations are provided in Section 7 that are geared toward further targeting the program and adjusting terms to maximize efficiency.



**Ranking and Rationale:** High priority—continue to offer consumer grants targeting RAC and TDPs, while further targeting top-priority market development opportunities by objectively considering potential market growth areas and opportunities for diversion per the criteria presented above, and seeking to reduce the cost per tire where possible. Also, consider shifting funding from the RAC Use Incentive grant program to a new TDA funding program (either a consumer grant program or a rebate program as described in Options 1.2 and 1.3).

## 1.6 Innovations Grant Program

**Definition and Precedents:** Under this option CalRecycle would allocate a portion of its funding budget to a new program intended to encourage innovative entrepreneurial activity by public and private entities. The program can be adjusted each cycle as CalRecycle objectives and market conditions vary, and could be structured to allow for different financial terms to incentivize different results. For example, a project that has large upside potential but carries some risk could initially be structured as a loan, but with a commitment to convert the loan to a grant if certain conditions are met (e.g., diversion of a certain number of California tires, successful production and marketing or a new type of TDP, or successful operation for a certain period of time, etc.), with the understanding that grant proceeds would then be used to expand performance results even further. Alternatively, ownership rights for new technology developed under the program might be assigned to the developer for a period of time, with the understanding that the technology would then become public, or licensed immediately with the potential for the grantee and/or CalRecycle to benefit financially (implementing these types of arrangements would require legislative authority). While CalRecycle would be limited under current legislation to certain terms and conditions, if successful the program could expand and diversify in future years. This grant model is adapted from the Beverage Container Market Development and Expansion Grant Program previously operated by the Division of Recycling, now part of CalRecycle. While this beverage container grant program does not allow for license agreements or equity partnerships, it does provide a high amount of flexibility to applicants to propose projects that address the high level performance objective of increasing diversion and/or other sustainability related measures. Another example of a similar program is the PIER grant program operated by the California Energy Commission.

**Diversion Impact:** Broadly projecting specific diversion impacts is impossible given the broad nature of this program. However, CalRecycle could choose to make documented new diversion the primary scoring criteria, as well as possibly targeting it specifically to particular market segments such as TDA or commercialization of new types of molded products. While this may limit somewhat the types of research projects that are eligible in practice, it would firmly ground the program in measurable results and also ensure compliance with related requirements in current statutory authority.

**Relative Stakeholder Impacts and Cost Considerations:** CalRecycle could allocate a portion of its funding budget, perhaps \$500,000 to \$1 million, to this pilot program.

**Implementation Process and Issues:** No new legislation or regulations would be required to implement this program, although as a new type of grant program it would require start-up costs and most likely adjustment as lessons are learned. To make full use of the program's flexible approach, legislation would be required to allow CalRecycle to negotiate terms that may call for it to earn revenue or share ownership in intellectual or hard assets. For example, CalRecycle could seek legislative authority to enter into license agreements or equity partnerships where such risk and revenue sharing arrangements clearly further market expansion and diversification goals, with all resulting information becoming public after a certain point in time. Implementing a

program like this would require CalRecycle to either develop in-house expertise in various investment opportunities and/or to access experts through other means, although the program can certainly be implemented without recourse to such innovative and untried arrangements such as state licensing agreements or equity partnerships.

Some key implementation items include beginning the solicitation process by asking for short pre-proposals that are not overly taxing for applicants to complete or for CalRecycle staff to review. The solicitation should expressly provide CalRecycle with the opportunity to negotiate alternative arrangements with proposers and to choose not to fund any proposals if a clear, worthwhile benefit is not identified. Again, it would be important for CalRecycle to weigh applicants in an objective manner, using developed criteria that support their market development goals.

**Ranking and Rationale:** High priority—Pursue in the short term by allocating a portion of the overall funding budget to a pilot project, perhaps \$500,000 to \$1 million.

### 1.7 Supplier Loans (Current Program)

**Definition and Precedents:** This option is the same as the current Tire Equipment Loan Program, which was addressed in Section 4 along with other funding assistance programs. It is also included in this section to provide a side-by-side comparison with potential new funding mechanisms, along with other policies and programs evaluated in this section.

The program provides processors and TDP producers with access to low-interest loans, with the funds usually used to expand production capacity, although a variety of uses are allowable. According to the 2010 Scrap Tire & Rubber Users Directory, seven U.S. states in addition to California offer some type of low-interest loan program to foster tire processing and recycling. As was proposed in CalRecycle's 2002 policy analysis report, one program (in Pennsylvania) reportedly allows for the possibility of converting loans to grants subject to attainment of specified goals, providing the state with further leverage to benefit from its investment (albeit without returning loaned funds through repayments).

**Diversion Impact:** Based on statistics from four recent Tire Equipment Program Loans, continuing the program at the average annual level of \$2.4 million as in the current Five-Year Plan could yield about 1.2-6.1 million PTE per year capacity, or about 3-12 percent of total tire generation. Because this is processing or TDP production capacity and not actual diversion, CalRecycle should be cautious about investing too heavily in expanded capacity too soon, as discussed elsewhere in this report.

**Relative Stakeholder Impacts and Cost Considerations:** The Tire Equipment Loan program is an extremely efficient expenditure in that loans are typically repaid in full, with interest. In the event that CalRecycle chooses to convert a loan to a grant, it would result in a cost that otherwise would not occur if the loan were repaid; however, it would also provide an additional opportunity to leverage the successful investment by requiring the recipient to implement certain programs such as marketing efforts or others in exchange for converting the loan to a grant.

**Implementation Process and Issues:** This option does not require legislation or regulations, and is a widely supported, established program. As discussed elsewhere, CalRecycle should require applicants to document the market need for any proposed new capacity or projects, and to address any identified concerns related to potential market disruptions.

**Ranking and Rationale:** High priority—Continue to implement this program, and expand somewhat the current evaluation of market need to consider broad trends in waste tire processing

infrastructure to allow evaluation of the risk of a supply glut situation, and/or to target funding to specific infrastructure needs that may be identified in the future.

## ***Options to Adjust State Funding for Tire Market Development***

### **Overview**

Following are analyses of three options that would impact the current funding mechanism that generates revenue for waste tire market development programs:

### **2.1 Increase Portion of Current Fee Amount or the Percentage Allocated to CalRecycle**

**Definition and Precedents:** Under current statute, purchasers of new tires in California pay a retail fee of \$1.75, which is collected by the Board of Equalization under a memorandum of understanding with CalRecycle. Tire dealers collecting the fee are allowed to retain 1.5 percent for administrative costs, and \$0.75 is transferred to the California Air Pollution Fund for use by the California Air Resources Board in activities related to waste tire management. This arrangement is scheduled to sunset in January 2015 when the fee will be reduced to \$0.75 per tire, with all net proceeds being retained by CalRecycle. Some industry observers have suggested that presently, it appears likely this sunset provision may be removed, extending the current fee system for a longer period. However, that is speculative and other types of adjustments are certainly possible as the sunset date approaches. CalRecycle receives proceeds generally in the range of \$40 million per year, with \$18.5 million per year, on average, allocated to market development activities as defined in this report, in the current Five-Year Plan through 2012/13.

Under Option 2.1, the fee amount would be increased, or the portion allocated to CalRecycle increased, in order to provide additional funds for market development activities. According to the 2010 Scrap Tire & Rubber Directory, seven states currently have tire fees of \$2.00 per tire or higher, although in nearly every case a high percentage of the revenue is allocated to the state general fund or, in one cases, highway department, with relatively less allocated to market development than in California.

**Diversion Impact:** Adjusting the tire retail fee and/or allocation would not in itself have any impact on diversion. However, a portion of the funds could be used to augment any of the waste tire market development programs or policies discussed in this report. By way of illustration only, increasing the fee by \$0.50 (or allocating an additional \$0.50 of the current fee to CalRecycle specifically for market development purposes) would approximately double CalRecycle's current market development budget. Allocating these funds to grant programs as currently structured could significantly increase diversion. For example, allocating \$18.5 million to the current consumer grant programs as currently operated (assuming there were sufficient demand for them, and that diversion as proposed in applications is accurate) would increase diversion by 2.3-3.0 million PTE, although it is impossible to know what portion of this activity might have occurred anyway or would be likely to continue in the absence of state support.

**Relative Stakeholder Impacts and Cost Considerations:** This policy would either impact the CARB, which would lose 66 percent of its current tire fund revenue (about \$12 million annually), or would impose additional costs on tire consumers. Tire dealers, while likely to oppose any fee increase, would gain additional revenue assuming the provision is retained allowing them to keep 1.5 percent of the fee for administrative purposes.

**Implementation Process and Issues:** Any adjustment to the fee would require legislation. In the current political climate increasing state fees for a purpose other than supporting the general fund



is probably not feasible. Current state economic situation aside, it is likely not feasible under any circumstances for CalRecycle to be awarded additional resources for the tire management fund, given the relatively high level of funding already available for waste tire management in California.

**Ranking and Rationale:** Low Priority—Because CalRecycle currently has a substantial tire market development budget, and because of the current political context of a prolonged economic downturn and a sustained state budget crisis, it is not recommended that CalRecycle seek additional funding at this time. However, in the future, if CalRecycle seeks to expand funding levels as part of an aggressive effort to achieve the 90 percent diversion goal, the retail tire fee mechanism is recommended over the landfill tip fee option (Option # 2.3 below) because of administrative simplicity, and because charging a tip fee would raise concerns over “double dipping,” or charging twice for support of state tire programs. Furthermore, the landfill tip fee, while providing a small disincentive to disposal, would impose added costs on generators, haulers, and processors.

## 2.2 Decrease the Current Fee Amount

**Definition and Precedents:** In contrast to Option #2.1, this option would involve reducing the tire retail fee and/or the portion of it allocated to CalRecycle’s market development efforts. This option is included in this analysis primarily to provide a source of information to aid in evaluating potential proposals to reduce or eliminate the current tire fee as the sunset date approaches.

**Diversion Impact:** It is difficult to precisely predict the impacts of abruptly shutting down CalRecycle’s market development programs. Over the course of the past two decades, and especially since the program was expanded in 1999, CalRecycle has had a significant positive impact on the expansion of tire recycling markets and diversion levels. The agency helped fund the development of a highly robust processing infrastructure, conducted work that directly assisted in developing the TDF market (prior to the legislative ban on supporting TDF), RAC, and TDA use, as well as ADC. Together, these markets account for about 38 percent of total waste tire generation, and more than half of all current diversion activity.

Since these markets are already developed, the potential impacts of removing further support would include possible backtracking of progress made to date, particularly in the processing arena where some firms continue to address challenging economic and market situations. And, potential growth, as described in Section 2 of this report, would be in jeopardy. While the goal of CalRecycle funding and other market development mechanisms and programs is to catalyze ongoing, self-sustaining demand for waste tires in recycling markets, the extent to which some markets are dependent on CalRecycle support (especially playground and some processors) remains a critical unanswered question.

However, given the agency’s strong role in previous years in developing the current, relatively diverse and substantial market infrastructure, it is reasonable to assume that removing these efforts would put future recycling market growth and sustainability in jeopardy. In the worst-case scenario, this could result in increased disposal of tires, increasing costs to generators, haulers, and processors and possibly even a return to widespread illegal disposal that led to significant illegal stockpiles with substantial environmental and health risks in the 1990s.

**Relative Stakeholder Impacts and Cost Considerations:** Removing the tire fee would reduce costs to tire consumers. However, all other players in waste tire management would see a net cost and/or loss of revenue. Further, costs associated with increased cleanup efforts that would need to be undertaken in response to an increase in illegal disposal could offset these savings.

**Implementation Process and Issues:** Removing the fee or reducing the allocation to CalRecycle would require legislation. While some tire dealers and anti-tax groups may support this, especially a reduction over a wholesale repeal, many diverse groups would likely support continuation of the tire fee. As discussed above, some industry experts feel the current 2015 sunset of the fee and reduction is not likely to happen.

**Ranking and Rationale:** Low priority—Do not pursue.

## 2.3 Adopt a New Tire Disposal Tip Fee

**Definition and Precedents:** Under this option, a new fee would be imposed on the landfill disposal of waste tires, providing an additional source of funding for state waste tire market development programs. The fee could also be imposed to replace a portion of the tire retail fee, with a proportionate decrease in the retail fee. The fee could be collected in tandem with the current AB 939 tip fee on all disposed municipal solid waste (MSW). We are unaware of any states that impose a tire-specific disposal fee, although several impose general MSW tip fees to fund state programs. Also, local governments in some states (such as North Carolina) charge a higher tip fee at their landfills and transfer stations for the disposal of scrap tires on which the tire retail fee has not been assessed. This is to help encourage residents to leave scrap tires with retailers in order to properly manage scrap tires.

**Diversions Impact:** In theory, a landfill disposal fee provides a disincentive to disposal and thereby may lead to increased diversion. The amount of increased diversion is dependent on the amount of the fee as well as the availability and economics of diversion and out-of-state disposal options. Reported landfill-imposed tire disposal tip fees in California currently range from a low of \$25 to \$38 per ton to \$82 to \$96 per ton, with the higher costs generally reflecting the ability to drop off whole tires that are shredded on site. Based on preliminary 2009 market analysis data, only about 19 percent of all tire disposal occurs in Northern California, with 81 percent of disposal in Southern California. The state's one dedicated tire disposal facility, Azusa, accounts for about 75 percent of all state tire disposal and reports a gate fee of \$65 per ton for whole tires and \$35 per ton for tire shreds.

For illustration purposes only, under the baseline 2015 scenario (assuming continued growth, optimization of CalRecycle programs under current funding and that no major threats materialize), a \$0.50 per PTE tip fee would generate approximately \$5.7 million, or nearly one-third of CalRecycle's current average annual market development budget of \$18.5 million as reflected in the current Five-Year Plan. In the scenario where the 90 percent goal is achieved in 2015, such a fee would generate about \$2.9 million. This \$0.50-per-tire fee is equivalent to \$50 per ton, or a 77 percent increase in the posted gate fee charged at the largest tire disposal site in the state. Assuming diversion options are available to haulers and/or processors, this could serve as a powerful incentive for diversion. The resulting revenue could be specifically dedicated to identifying and developing diversion opportunities near existing landfills, but again it is not evident that such opportunities are currently available to be developed beyond the pace of current development.

**Relative Stakeholder Impacts and Cost Considerations:** Imposing a tire disposal fee would result in higher costs to some waste tire generators, haulers, and processors, based on the increased diversion and/or disposal costs ranging as high as 77 percent of the posted Azusa gate fee, but presumably less to other generators, haulers, and processors, to the extent that lower cost diversion alternatives are available. While processors might pass these costs on to generators, in some cases competitive pressure among processors may preclude that. CalRecycle would likely

incur additional costs to administer the new tire disposal fee, through an increase in the cost paid to the Board of Equalization to administer the fee.

**Implementation Process and Issues:** Imposing a new tire disposal fee would require legislation, which would likely be opposed by many firms and groups. As with other funding mechanisms, proposing such a change during a time of sustained government budget crises at the state and local levels is not likely to be feasible, and may well be politically risky. Moreover, imposing the tip fee without a proportional reduction in the retail fee would leave advocates of the change open to concerns of “double-dipping,” that is, charging multiple times for the same state service.

**Ranking and Rationale:** Low priority—Do not pursue. Because CalRecycle already has a strong funding mechanism for waste tire market development, and because of feasibility concerns and the political risk of exposing the agency’s current funding mechanisms to possible reduction, proposing new funding is not recommended at this time. Because of concerns over double charging, imposing new costs on tire management firms and the questionable diversion impacts of a new tip fee, it is recommended that if CalRecycle chooses to seek additional funding, it should propose adjustments to the retail fee over imposing a new tire disposal tip fee.

## ***Options to Implement TDP Use Mandates***

### **Overview**

Use mandates generally require specified agencies to purchase specified types of recycled-content products. Requirements can vary in many ways. Following are three options involving adjustments to current programs already in place in California:

### **3.1 Strengthen and Expand Current State TDP Purchase Price Preference Requirements.**

**Definition and Precedents:** This option would strengthen the already extensive purchasing preference programs in place in California.

Nationwide, many states have recycled product purchase preferences of various types and according to the 2010 Scrap Tire & Rubber Directory, 17 states have specifically adopted purchase price preferences for recycled tire products, with most set at 10 percent and some at 5 percent.

Over the past two decades, a number of statutes have been adopted in California, with CalRecycle generally playing a reporting and oversight role. CalRecycle’s main initiative in this area is the State Agency Buy Recycled Campaign (SABRC), which was developed after passage of AB 4 in 1989. SABRC is a joint effort with the Department of General Services (DGS) to implement state law requiring state agencies and the Legislature to purchase a variety of recycled-content products.

Following is a synopsis of the many different legislative requirements related to state and local procurement of tire-derived products that are currently in place in California:

Current statute requires that one-half of state agencies’ purchases in specified product categories be for products that qualify as recycled content. For tires, in order for state agencies to count tire-derived products as recycled content, the minimum content requirement for that product category is 50 percent recycled used tires (PCC section 12209(j)). State agencies also must track purchases and submit an annual report. In 2008, agencies reported a total of \$1.1 million in purchases of tire-derived products and \$8.4 million in retread tires purchases. Many different recycled products

are specified in the legislation as reportable, including truck, bus, and fleet vehicle tires; and tire-derived products including, but not limited to, flooring, mats, wheelchair ramps, playground cover, parking bumpers, bullet traps, hoses, bumpers, truck bedliners, pads, walkways, tree ties, road surfacing, wheel chocks, rollers, traffic control products, mudflaps, and posts. Statute requires DGS to revise procedures and procurement specifications for TDPs, including "...rubber, oil, natural gas, carbon black, asphalt rubber, floor tiles, carpet underlays, mats, drainage pipes, garbage cans, retreaded tires, and water hoses...." For these purchases DGS is required to give a price preference of 5 percent of the lowest bid (PRC 42891). The price preference is required to be applied "...to the extent possible, so as to maximize the dollar participation of recycled tire product businesses." (PRC 42892). Statute also limits this preference to not exceed \$100,000 each year (PRC 42893). A separate retread program (PRC 42400-42412) requires that DGS fleets use retreads.

Current statute also requires Caltrans to use a variety of recycled products in paving or paving sub-base, and to consider product life-span, durability, and maintenance costs (PRC 42701). These requirements include paving materials utilizing crumb rubber from automotive tires, but not use of tire-derived aggregate or other TDPs. A separate legislated program required Caltrans to annually report to CalRecycle the number of waste tires used in paving and civil engineering projects (SB 876, 1999). And, statute also requires Caltrans to increase the amount of RAC used and the amount of ground rubber used per ton of asphalt mix. (AB 338, Statutes of 2005).

Of the many legislative requirements described above, the Caltrans RAC use mandate has had by far the highest impact. Caltrans used 3.5 million tires in 2008 in RAC applications, and RAC is now well established in many regions for many applications. However, there is anecdotal evidence that the remaining legislative elements have not significantly increased sales of products made from recycled tires, based on the perspectives offered from waste tire processors and TDP producers/installers, as well as observations of consultants working with firms through the TBAP program.

Some possible reasons for these requirements not being more effective include:

- Lack of enforcement authority or staff resources, and a lack of effective penalties for noncompliance;
- The relatively low profile/priority of TDPs compared to other products and purchasing requirements;
- The price preference applies only DGS, and not to other agencies unless DGS specifically does their purchasing of these products;
- Sometimes higher initial costs compared to competing products, even if life-cycle costs are lower and other performance benefits apply; and
- In the current budget situation agencies are focused on lowest cost options generally.

With this rich backdrop, this policy option considers strengthening current government agency purchase preference for tire-derived products. by one or more of the following steps:

- Providing some type of effective enforcement mechanism and funding with authority for an agency (e.g., CalRecycle) to undertake monitoring and compliance actions;

- Expanding it to apply to all state agencies, and increasing the price preference from 5 percent to 10 percent of the value of the next highest bidding product;
- Expanding it to specifically include use of tire-derived aggregate by state agencies in specified civil engineering applications;
- Requiring a specified price preference be applied whenever product quality and other factors are equal, and where CalRecycle determines life-cycle costs are favorable;
- Allowing CalRecycle to designate certain products as TDPs under current statute that may contain less than 50 percent tire rubber, if the products use rubber at a significant and feasible level for the product type and has the potential to significantly expand tire recycling markets;
- Providing CalRecycle with the authority to adjust the details of the requirement, including the amount of the required purchase price preference under certain conditions, for example, if the results of an environmental and cost life-cycle analysis determined higher initial costs were merited because they would save agencies money over time; and/or
- Potentially expanding requirements to local agencies as well as state agencies.

The price preference could be implemented in conjunction with a grant or rebate program to cover a portion of the cost differential, and be supported by promotional outreach and technical assistance.

**Diversion Impact:** The potential diversion impact of use mandates depend on the products included, whether state and/or local agencies are included, and the type of preference. Following are several examples qualitatively illustrating potential diversion impacts:

- **RAC**—The current Caltrans use mandate (combined with many years of supporting efforts) has effectively established RAC as a mainstream use; anecdotally, local agency use of RAC appears to be growing in part due to CalRecycle funding and technical assistance support. However, the market size estimate provided in this report indicates that there is significant potential to further increase local use of RAC;
- **TDPs Made from Ground Rubber**—A range of TDPs are currently purchased by state agencies, including delineator bases, transition ramps, and modular drains. While there is considerable room for growth, the vast diversity of product types makes quantification or definition of products in a mandate challenging;
- **TDA**—CalRecycle’s TDA technical staff has concluded that civil engineering applications do not readily lend themselves to use mandates because many uses are not standardized and involve consideration of alternative aggregate sources (especially for lightweight fill) on a case-by-case basis. Also, there are liability issues associated with some projects, like landslide repair that are cause for caution. Also, the economics of TDA use varies locally depending on a number of factors, like the availability of conventional aggregate sources. For these reasons, TDA may lend itself more to a price preference mandate than an outright use mandate.

A price and/or purchasing preference could apply only to state agencies or could also be applied to local agencies. Especially if combined with a rebate program to cover all or a portion of the price differential, along with sustained outreach and technical assistance, the price preference could prove effective.

**Relative Stakeholder Impacts and Cost Considerations:** Assuming CalRecycle's legislated role is to oversee reporting and monitor compliance of price preference programs, as it does with current buy-recycled programs, CalRecycle costs would probably be limited to incremental needs for additional staff. However, as discussed under Option #2.2 above, CalRecycle may voluntarily choose to allocate funding for rebates to complement and augment a purchase price preference.

**Implementation Process and Issues:** Any adjustments to current purchase preferences will require legislation and possibly new rulemaking. State and local agencies covered by the mandate, as well as anti-tax and other stakeholders, are likely to oppose requirements. Tire recycling industry representatives are likely to support it. One option would be to seek a complete re-write of current buy-recycled statutes as there are many mandates appearing in diverse areas of current law.

**Ranking and Rationale:** Medium priority—Raise with stakeholders and consider options to expand and strengthen current purchase preferences and to provide a stronger, more effective price preference, covering both state and local agencies. Expand outreach, education, and technical assistance efforts to assist agencies in complying with any new purchase price preference requirements. This option should be explored with stakeholders in tandem with option 3.2 below.

### **3.2 Mandate TDA Use by Local/State Agencies in Specified Applications**

**Definition and Precedents:** This option would go further than Option #3.1 by mandating that certain state and/or local agencies purchase specified TDPs. While many states have adopted specifications and have strong practices that result in purchase of certain TDPs, few states have adopted legislation or regulations that actually require such purchasing. In its list of state programs, the 2010 Scrap Tire & Rubber Directory only identifies California as having any type of TDP use mandate (for RAC use by Caltrans). One example of a use mandate is New York, which adopted legislation requiring the State Department of Transportation to utilize tires from cleaned up noncompliant stockpiles as tire-derived aggregate in transportation projects.

**Diversion Impact:** This option would focus on extending the current Caltrans RAC use mandate to local agencies. The requirement would likely need to be tailored in such a way that it identified the most feasible and advantageous applications and set reasonable targets for increased use. It would also include an option for agencies to request an exemption (either from Caltrans or CalRecycle) under specified circumstances. While the political feasibility of this action may be low, it holds the promise to greatly increase the current market penetration of RAC from about 12 to 17 percent currently to capture more of the estimated 25-35 million PTE in potential demand for RAC. While this option would likely increase short-term costs, proven RAC life-cycle benefits could actually reduce costs over the long term, again emphasizing the need to coordinate activities with research and outreach to frame the perception of such a policy shift.

While other products and agencies could theoretically be included in a local agency use mandate, we do not include them here because of challenges in identifying specific products and applications that lend themselves to a mandate. However, as described in Option 3.1 there are a wide range of TDPs that theoretically could be included in a use mandate, including molded/extruded products such as transition ramps, delineator bases, and flooring backing, or



tire-derived aggregate. While the total increased demand of these other products may be dwarfed by potential increases due to local RAC use, a use mandate for them could have significant benefits in terms of expanding California production of these products. Also, a TDA use mandate could potentially have big impacts; however, it may not lend itself to a mandate due to the variety of project-specific considerations that must be considered in using TDA in civil engineering applications.

**Relative Stakeholder Impacts and Cost Considerations:** Assuming CalRecycle’s legislated role is to oversee reporting and monitor compliance of price preference programs, as it does with current buy-recycled programs, CalRecycle would incur staffing costs and possibly costs for support in developing needed outreach, technical information and monitoring/enforcement duties. Local agencies would likely see increased costs since their purchasing options would be more limited than previously. However, as discussed under Option # 1.2 above, CalRecycle may voluntarily choose to allocate funding for rebates to complement and a purchase price preference program, and offset to a degree the potential increased initial costs of participating agencies.

**Implementation Process and Issues:** Legislation would be required to impose new mandates. A major concern would be political feasibility especially of a perceived additional local unfunded mandate.

**Ranking and Rationale:** Medium priority—Evaluate further by soliciting stakeholder feedback and investigating key concerns and how they may be addressed. Further explore the relative merits of strengthening purchase and/or price preferences as discussed under Option 3.1 above, compared to a use mandate. If adopted, expand outreach, education, and technical assistance efforts to assist agencies in complying with any new purchase price preference requirements. This option should be explored with stakeholders in tandem with option 3.1 above.

### **3.3 Require CA Tire Rubber under Current Caltrans RAC Mandate**

**Definition and Precedents:** Caltrans is currently required to meet specified usage thresholds for ground rubber and RAC; however, ground rubber purchased to meet the mandate may be purchased from any U.S. state, and needn’t be limited to California generated waste tires.

**Diversion Impact:** Caltrans reports that in 2008 it used ground rubber equivalent to 3.5 million PTEs, or about 45.5 million pounds of ground rubber, and that same year California producers reported that they sold about 56 million pounds of ground rubber to local and state RAC projects. Based on grant applications, annual CalRecycle-funded use of California ground rubber is in the range of 409,000 PTE, equivalent to about 5.3 million pounds of ground rubber. The missing statistic is an estimate of total local government and private sector RAC demand, which is not available. However, it appears that California producers exceeded demand from Caltrans and local grant-funded RAC projects, implying that use of out-of-state rubber in RAC projects may not be that high. For the sake of illustration, if 15 percent of Caltrans’ current ground rubber supply comes from out of state and was replaced with California-produced ground rubber, it would equate to an additional 0.52 million PTEs being diverted.

**Relative Stakeholder Impacts and Cost Considerations:** No costs to CalRecycle would result from this policy. However, it is possible that Caltrans costs may increase in some cases where out- of-state suppliers can meet ground rubber needs more cost effectively. For example, one Arizona facility produces ground rubber for the RAC market in California, and facilities as far away as Utah and Alberta are known to sell ground rubber in California for a variety of applications such as RAC and athletic fields. In some cases, even with the increased shipping costs, these suppliers may be able to beat California producers’ prices because of subsidies in



their home government or because California ground rubber often is sold at a somewhat higher price than in many other states, perhaps due to higher production costs and/or state requirements that grant-funded projects use California-derived rubber. This requirement could result in increasing prices for California ground rubber, thereby providing enhanced revenues to California producers while raising costs to certain TDP producers and consumers.

**Implementation Process and Issues:** This would require legislation and would run the political risk of seeking a change that could raise state and/or local costs (if the current RAC mandate is extended to local agencies as discussed under Option #3.2 above). This option has reportedly been determined to be infeasible due to the federal Interstate Commerce Clause, although documentation of this determination was not located during research for this report.

**Ranking and Rationale:** Medium priority—Confirm whether this option is precluded by the federal Interstate Commerce Clause and pursue if appropriate. Although political feasibility is uncertain and carries some risk, the benefits of this policy—while not precisely quantifiable at this time—would be immediate and tangible. And while it may add a cost, it also would benefit California producers and have a significant impact on tire markets for a high value commodity.

## ***Options to Implement Extended Producer Responsibility***

### **4.1 Adopt an Extended Producer Responsibility Policy**

**Definition and Precedents:** Extended producer responsibility (EPR) mandates make product manufacturers responsible for funding and implementing programs to achieve specified goals. In the U.S. and Canada the term product stewardship is often used. While initially product stewardship connoted an emphasis on shared responsibility, and often a bias for voluntary initiatives developed through multi-stakeholder dialog, in recent years the two terms have become virtually synonymous. CalRecycle's predecessor, the California Integrated Waste Management Board, adopted a strategic directive calling for more product stewardship, and the agency has been involved in many initiatives exploring possible approaches to such products as paint, pharmaceuticals, and electronics, often with involvement by the National Product Stewardship Institute (a coalition of state and local agencies headquartered in Massachusetts) or the California Product Stewardship Council (a coalition of California local governments headquartered in Sacramento).

Catalyzed by the three-year National Electronics Product Stewardship Initiative, California was the first state to adopt an electronics recycling system. However, the system adopted is based on a retail fee, with proceeds subsidizing collectors and recyclers of covered electronic devices. To date, the only EPR legislation in place at the California state level covers mobile phones and thermostats and requires take-back to retailers, with original equipment manufacturers responsible for recycling. San Luis Obispo has adopted a local take-back ordinance for select products associated with household hazardous waste. In addition, several voluntary programs operate in California, as elsewhere, including take-back programs for a variety of batteries.

In the U.S. no tire-related EPR mandates exist. However, a European Union directive has resulted in a slate of national EPR programs covering tires and many other products. In Canada most provinces have adopted "product stewardship" mandates for a wide variety of products, including tires.

While an EPR system can be structured in many different ways, Ontario's program (which closely mirrors British Columbia's) can serve as a model. Ontario Tire Stewardship was adopted in 2008 and requires the tire manufacturing industry to implement a program to collect and divert

on- and off-road tires from disposal and burning. OTS is responsible for developing, implementing and operating diversion programs. The used tire program is funded by “Brand Owners” and “First Importers” of tires—collectively referred to as “stewards,” who remit a Tire Stewardship Fee to OTS for every tire they supply into the Ontario market. The fees are used to fund all aspects of the program. OTS provides financial incentives to registered organizations that collect, transport, and process used tires or manufacture recycled products in accordance with the program plan. In the first year of the program this represented a \$23 million investment in the Ontario tire recycling industry. The program aims to reach a diversion rate of 90 percent of on-road tires and 50 percent of off-road tires within five years.

Key variables for a California tires EPR program include (but are certainly not limited to):

- Would there be restrictions on the types of markets tires could flow to?
- What, if any, would be the role of local agencies?
- How would the role of CalRecycle change?
- What recycling rate would be required?
- What limitations on funding and programs would be imposed?

**Diversion Impact:** EPR is not at its root a market development strategy, per se. Rather, EPR mandates are mainly motivated by a desire to move to a product-based environmental management system, rather than an end-of-pipe system. EPR advocates generally cite as reasons for implementing EPR the need to: make producers responsible for product end-of-life management in order to provide an incentive for design-for-recycling; internalize product-related costs that have historically been externalized (and covered by local agencies and tax payers as an “unfunded mandates”); and ensure a self-sustaining system.

EPR mandates often include a requirement that a specified recycling rate be achieved. In the case of Ontario, for example, the goal is to recycle 50 percent of off-road tires and 90 percent of on-road tires within five years, and no TDF unless market conditions require it.

A California EPR system could, in theory, require a 100 percent recycling rate, or any other specific rate, as well as identify restrictions or a hierarchy of market priorities. However, whether any identified recycling rate is more likely to be achieved by industry rather than government may depend on whether one believes the private sector is inherently more efficient and capable than government agencies, a debate that is beyond the scope of this report.

However, privately operated recycling organizations in Canada and Europe show that they have a much higher degree of flexibility and can adapt quickly to changing market conditions, and can garner the entrepreneurial and investment sophistication of their members and bring it to bear expanded recycling.

**Relative Stakeholder Impacts and Cost Considerations:** An EPR mandate would, in essence, completely transform the current framework for waste tire management in California, with some clear “winners” and some clear “losers.” Table 6-3 identifies some key impacts to different stakeholder groups. Assuming the mandate included full responsibility for diversion and market development, CalRecycle market development programs would likely be scaled back substantially, allowing for a similar reduction in the retail fee.

**Table 6-3. Stakeholder Impacts of Extended Producer Responsibility (Based on the Ontario Product Stewardship Model)**

Stakeholder Group	Potential Revenue and Other Benefits	Potential Costs and Concerns
CalRecycle	Reduced responsibilities for waste tire market development.  Likely reduced revenues from an adjusted tire retail fee.	New costs for enforcement and compliance monitoring related to the EPR mandate.
Processors	High Revenue Benefit—\$0.25-\$1 or more per tire handled.  Steady revenue.	Likely concerns regarding required claim processing and documentation requirements.  Possibly concerns regarding reduced competition for tire collection accounts, processing contracts and other potential market disruptions.
TDP Producers	Possible raw material price benefits or subsidy.  Possible new contract opportunities with producer organization.	Possible disruptions to established supply sources and pricing as systems are implemented and adjusted over time.
TDP Consumers	Possible TDP price benefits.	NA
Tire Producers	Control over managing tire management revenues.	New costs to develop, operate and maintain the new system over time (presumably covered through new fee mechanisms).  Potential liability costs if implementation is not successful or deemed noncompliant, or due to tire fires or other mishaps.
Tire Dealers	Possible reduction or elimination of the tire generator fees currently paid to haulers.	Possible need to administer both a state tire fee (albeit reduced amount due to reduced state responsibilities) and a new privately administered management fee.
Tire Consumers	Possible reduction of the net amount of fees paid while purchasing new tires.	Small possibility that net tire retail and management fees may increase.

**Implementation Process and Issues:** Implementing a tire EPR mandate would require legislation. Because of its complexity and the fundamental impact it would have on so many groups and virtually every aspect of current waste tire management practices, the legislation would likely take at least two years to adopt, and would garner a wide range of supporters and opponents, a landscape which could change repeatedly as any proposed bill evolved through the legislative process.

**Ranking and Rationale:** Medium priority—Although EPR is not commonplace in the U.S., it is recommended that CalRecycle investigate the potential structure that such a program might take

in California, and solicit feedback from stakeholders regarding their impressions of how a system could potentially work in California. Stakeholders can provide unique perspective regarding considerations and potential unintended consequences that such a policy might evoke.

## Other Options

### Overview

Following are evaluations of five additional policies that were identified by stakeholders and/or the project team:

#### 5.1 Ban on Landfill Disposal of Tires

**Definition and Precedents:** California statute currently bans the landfill disposal of whole tires. In 2008 14 landfills were identified that received appreciable quantities of waste tires for disposal, with a total of 12.3 million tires estimated to be disposed. More than 60 percent of these were disposed at a single facility located in Azusa, in Southern California. The facility is dedicated exclusively to waste tires, although technically, the facility is not considered a waste tire monofill by CalRecycle.

Under this policy, legislation would be adopted calling for a complete ban on the landfill disposal of waste tires, regardless of whether they have been size-reduced. The ban would apply to both MSW landfills and waste tire monofills. (While currently no California facilities are permitted under the monofill regulations, there is one facility that could potentially switch its status from an MSW to a monofill facility.) We assume the ban would be phased in over a period of time. It could also be imposed conditionally, for example, not until demand for California waste tires is documented to exceed supply for a period of one or two years.

As shown in Table 6-4 below, at least 13 states currently have a total ban on waste tire disposal in MSW landfills, although two of these currently allow disposal in monofills. (One of these, Colorado, is in the process of phasing out monofills as well.) No states were identified that made their ban subject to a market test, although the Commonwealth of Massachusetts has such a test for several other material landfill bans.

**Table 6-4. Examples of States Banning Waste Tire Landfill Disposal**

State	Ban on Landfill Disposal of Whole, Shred, or Cut Tires	Monofills Allowed
Colorado	No	Yes
Connecticut	No	No
Georgia	No	No
Illinois	No	No
Maryland	No	No
Maine	No	No
Minnesota	No	No
Nebraska	No	No
New York	No	No
Ohio	No	Yes

State	Ban on Landfill Disposal of Whole, Shred, or Cut Tires	Monofills Allowed
Rhode Island	No	No
Vermont	No	No
Wisconsin	No	No

Several of the states listed in the table have strong waste tire markets. For example, in the Midwest and Northeast, there is high use of TDF by electric utilities, cement kilns, pulp and paper mills, and steel mills using electric arc furnaces, as well as one large dedicated TDF facility. For many states in this region demand for waste tires exceeds total generation.

**Diversion Impact:** Theoretically, a disposal ban will result in 100 percent diversion, but that observation alone misses the point of the policy. R. W. Beck recommends that a ban not be imposed unless sufficient markets for all generated tires are unambiguously in place. The objective of the policy would be to signal to the market the state's intent to phase out waste tire landfill in the future, for example, by January 2015. This clear state policy would signal to market players the need to adjust business practices accordingly. In tandem with the other market development programs and policies, this could help further the state's diversion goal. One further option would be to announce a zero waste goal for tires, effectively changing the current 90 percent diversion goal to a 100 percent diversion goal.

**Relative Stakeholder Impacts and Cost Considerations:** If adopted, CalRecycle would incur costs for staff time related to implementing the ban, and would need to develop and deploy outreach and educational materials to ensure that the ban and its implications are understood correctly. If the ban was conditional upon a test, such as documentation of demand exceeding supply, CalRecycle would incur costs to research and prepare such documentation. Documenting whether waste tire demand exceeds supply could be challenging if demand and supply are not far apart. However, in circumstances in which demand clearly far exceeded supply, providing this documentation may be much less costly. While this fact could reduce the likelihood of implementing the ban, it would still allow the policy goal to be established to help drive progress towards the goal of zero disposal in landfills. Costs to tire generators, haulers, and processors may well increase if they are forced to identify more costly outlets for tires other than landfill disposal. The economic impact on certain landfills, in particular the Azusa landfill which currently exclusively accepts tires, could be significant.

**Implementation Process and Issues:** Legislation would be required, and would be likely to be opposed by many firms in the California waste tire management industry, while others specializing in diversion activities may support it.

The most significant concern related to a landfill ban is whether it could lead to illegal stockpiling of tires, as occurred up until the 1990s and the launching of CalRecycle programs. According to one tire industry representative, this occurred in Minnesota in the 1990s. As indicated above, however, several of the states listed in Table 6-4 are in regions with exceedingly high waste tire demand.

**Ranking and Rationale:** Medium priority—Consider further the adoption of a phased landfill ban to be employed in 2015, subject to a determination that waste tire demand exceeds supply.

Consider combining this with a new waste tire zero waste policy to replace the current 90 percent diversion goal, and leverage the policy in outreach activities to help catalyze market transformation.

## **5.2 Secure Legislative Authority to Promote Tire-Derived Fuel (TDF)**

**Definition and Precedents:** California statute currently prohibits CalRecycle from providing support to efforts related to the use of waste tires as fuel (AB 1756, Statutes of 2003). Although some other states such as New York have identified tire-derived fuel as a lower priority or a less desirable market, TDF remains a well-developed, self-sustaining market in many areas of the country. Federal and state regulators alike have approved TDF uses, including identifying use of TDF as one mechanism for complying with NOx air emission standards (however, see discussion below about a proposed new federal regulation that could negatively impact such use). Certain environmental organizations oppose TDF use, although it currently plays a central role in California's waste tire management system, and has the potential to greatly increase the number of tires used, if and when economic conditions improve to support cement industry growth.

**Diversion Impact:** The direct impact of changing policy to allow CalRecycle to support TDF is impossible to measure specifically. However, TDF is currently a critical component of the California waste tire management system and a proposed federal regulation could potentially jeopardize up to 5.4 million PTE of TDF demand in California (equal to 12.1 percent of total generation), or in proactively promoting expanded use of TDF in California to help capture more of the estimated potential market of 15 to 20 million PTE per year. In California in 2008, 7.5 million PTE, or 17 percent of all tires generated, were consumed in one of five cement plants and one cogeneration electricity generating facility.

**Relative Stakeholder Impacts and Cost Considerations:** The direct cost impact of this policy change would be minimal. CalRecycle would have the option of allocating staff time and/or a portion of the current market development budget to study and/or promote increased TDF use. Indirectly, the proposed federal rule could have a large cost impact on California cement plants. The rule would change the definition of whole tires combusted at facilities to municipal solid waste unless the tires are processed to 2-inch pieces. The net effect would be to require such facilities to receive solid waste facility permits, to be regulated as waste incinerators, and to shift to purchasing processed TDF (at a cost of perhaps \$20 to \$30 per ton or more) rather than receiving tip fee revenue from the receipt of whole tires (at perhaps \$40 to \$50 per ton). While some plants may continue to use whole tires, four of the six current TDF users require whole tires, with a combined 2008 use of about 5.4 million PTE. Costs to tire haulers and processor may rise as well if TDF market demand is reduced, as whole tires would then flow to disposal or other outlets with less favorable economics. These costs would presumably be borne by waste tire generators through adjustments to informal generator fees paid to haulers.

**Implementation Process and Issues:** Legislation is required. Certain environmental organizations are likely to oppose the change, while most waste tire industry representatives would be expected to enthusiastically support it. Beyond that, there are no identified implementation issues.

**Ranking and Rationale:** High priority—Pursue in the short term. While CalRecycle's ability to overcome threats to TDF demand or to expand demand is uncertain, the market is a critical component of the current waste tire management system, and has the potential to consume up to 15 to 20 million tires annually, which is nearly half of current generation.



### 5.3 Seek Recognition of TDF as a Renewable Fuel Stock under RPS Standards

**Definition and Precedents:** Several states have adopted renewable portfolio standards (RPS), which require specified electric utilities to document that a portion of their electricity is generated from renewable sources. California's RPS were originally adopted in 2001 (SB 1078) and then modified and accelerated in 2006 (SB 107) to required electric corporations to increase procurement from eligible renewable energy resources by at least 1 percent annually, until they reached the 20 percent goal by 2010. In 2008, Governor Schwarzenegger issued an executive order increasing the target to 33 percent by 2010, and in 2009 another executive order directed the California Air Resources Board to adopt regulations implementing the new standards under their authority as the lead agency for California's Global Warming Solutions Act. According to one tire recycling industry expert, North Carolina is the only state that allows TDF to qualify as a renewable resource under its RPS standard, although officials in Colorado and Illinois are looking into it.

Tire-derived fuel, as other waste-based fuels except source-separated biomass, does not qualify as a renewable resource under the current or proposed new rules. Under this policy CalRecycle would advocate for inclusion of TDF as an eligible renewable resource.

**Diversion Impact:** Currently the main source of demand for TDF in California is cement plants, which are not currently regulated under the RPS. Historically, several "cogeneration" facilities that use biomass and other fuels to generate electricity and heat have used TDF, although currently only one facility does. At least one facility has indicated that the RPS was a consideration in their decision to cease using TDF.

**Relative Stakeholder Impacts and Cost Considerations:** This policy would impose no new costs on CalRecycle or firms in the waste tire recycling chain or the regulated electricity generation sector. On the contrary, it would open the door to greater flexibility in fuel choice for electricity generators while potentially increasing value-added demand for the 2-inch tire chips typically used by cogeneration facilities.

**Implementation Process and Issues:** This policy would require either legislation or adjustments to the regulations currently being promulgated by the Air Resources Board. Many environmental organizations and competing renewable energy generators and fuel producers would likely oppose it. Furthermore, because the RPS is outside of CalRecycle's purview, it may not have strong standing in the development of rules. Furthermore, it may open the door to consideration of other waste materials as eligible renewable resources under the program, thereby potentially adding a barrier to further recycling expansion.

**Ranking and Rationale:** Low priority—Do not pursue. The RPS is outside of CalRecycle's purview and it is highly unlikely that TDF could successfully be adopted as an eligible renewable resource under the RPS at this time.

### 5.4 State Operation of Facilities/Ownership of Tire Monofills

**Definition and Precedents:** Under this new policy, CalRecycle would consider the ownership and/or operation of certain waste tire management facilities in order to further its goals. While the policy could potentially lead to a range of specific ventures, this evaluation specifically considers the potential for CalRecycle to seek to purchase the Azusa waste tire disposal facility and/or the operation of TDA supply depots.

The objective of obtaining ownership of Azusa landfill would be to either close it or operate it in such a way as to maximize recycling while ensuring continued proper disposal of waste tires that



are not diverted. Because of the facility's central role in Southern California waste tire management, this could expand the agency's ability to influence waste tire flows in the region.

Operation of TDA supply depots would seek to overcome the supply barriers to TDA expansion described previously in this report.

While no examples of state operation of waste tire facilities were identified, there are a few examples of state agencies operating other types of waste management and recycling facilities. For example, the Delaware Waste Management Authority and the Rhode Island Resource Recovery Agency both operate solid waste and recycling collection, processing, and disposal facilities. And, the Commonwealth of Massachusetts owns and operates (via a contractor) a regional materials recovery facility in Springfield which was established to fill a regional infrastructure gap.

**Diversion Impact:** Controlling Azusa landfill would allow the agency to set disposal prices and thereby influence the economics of disposal to a degree in the region. In the extreme, CalRecycle could close the facility or increase tip fees to a very high level, resulting in haulers and processors seeking other lower price alternatives. To the extent that supply is a constraint on diversion, this could result in increased diversion rates. However, to the extent that diversion is impeded by a lack of demand, this would have no impact and would merely result in increased costs and transportation, and possibly specifically resulting in increased export to Pacific Rim nations.

Operating a TDA supply depot would help facilitate demonstration of alternative TDA supply systems, thereby potentially facilitating the expansion of diversion into this nascent market.

**Relative Stakeholder Impacts and Cost Considerations:** No cost estimate is available on purchase of Azusa landfill, but given that the landfill currently accepts several million tires per year for disposal, the potential revenue stream alone would suggest a value of several million dollars. If CalRecycle closed the facility or increased tip fees substantially, the result would be increased costs to waste tire generators, haulers, and processors who would need to seek the next lowest cost disposal or recycling opportunity.

**Implementation Process and Issues:** CalRecycle ownership would require legislation. However, CalRecycle could contract for operation of a TDA supply depot under current legislation. Many companies involved in waste tire management would likely strongly oppose the policy as an intrusion into the private sector by government, with a strong likelihood of severe market disruptions.

**Ranking and Rationale:** Low priority—Do not pursue. CalRecycle is not well positioned to negotiate ownership of a privately held facility, and there is no precedent for such an action. Operating a TDA supply depot, if determined to have merit, could be done contractually through a grant or contract solicitation (for example, under the Market Development Innovations grant program described above).

## 5.5 Seek Regulatory Adjustments to Allow TDA Use in Septic Systems

**Definition and Precedents:** Under this option, CalRecycle would actively work with the State Water Resources Control Board (SWRCB) to adopt regulations that specifically allow or even encourage the use of TDA in septic tank leach fields as a replacement for other types of aggregate material. TDA is routinely used in a number of eastern states including Arkansas, Florida, Georgia, New York, North Carolina, South Carolina, and Virginia. In some of these states it is a large part of the market for tires diverted from landfill disposal. According to CalRecycle staff, legislation passed several years ago gave SWRCB, for the first time, the authority to regulate

septic systems. Although certain regional Water Quality Control Boards have septic requirements, statewide regulations have yet to be adopted, apparently due to a range of stakeholder concerns and controversies. In the absence of state regulations, California septic systems are currently mainly regulated by local environmental health departments, or building departments in a few counties. Therefore, the use of TDA in septic applications can theoretically be approved at the local level; however, many local agencies reportedly are reticent to do so without specific state sanctioning.

**Diversion Impact:** The estimated market for use of TDA in California residential septic systems is 4 to 8 million PTEs per year, although given that the current use is zero it would likely take several years to build appreciable demand. CalRecycle funded one research and demonstration project for this application, which included installing TDA in 1998 at an Interstate 5 rest stop in Stanislaus County, using 20,000 tires in the process. Although performance in this application has not been formally evaluated, the results indicated that TDA performed well as a replacement for conventional aggregate in this application. Unlike many other TDA applications, which require 60,000 to a few hundred thousand tires per project, residential septic applications would only require approximately 1,700 tires per residential home, thereby building incremental demand, consistent with strategies to help build TDA supply infrastructure steadily over time. However, this use could potentially have the benefit of providing demand in rural areas for scrap tires generated in those same areas, if processing capacity could be established.

**Relative Stakeholder Impacts and Cost Considerations:** During the SWRCB public hearing process with the initial proposed septic regulations in 2009, significant opposition was encountered. Mandatory monitoring costs would be incurred for all homeowners and retrofitting of certain systems would be required at significant expense. As a result of concerns for the proposed regulations from the public and local jurisdictions, the SWRCB decided to start over and is working on a complete rewrite of the regulations. According to CalRecycle staff, TDA was not a key element of opposition during the rulemaking process.

**Implementation Process and Issues:** Although TDA was originally included in the SWRCB septic regulations proposed in 2009, the language referencing alternative drainage materials was eliminated in the revised version in an effort to keep them as basic as possible, even though they were not an item of opposition. Although SWRCB was again revising regulations for septic systems in 2010, it may not be likely that SWRCB would consider including the use of TDA as an alternative drainage material in septic systems due to concerns over moving the entire package forward. While CalRecycle could, in principle, work directly with counties, this is more costly and probably would not bear great results without prior sanctioning by the SWRCB.

**Ranking and Rationale:** High priority—Pursue in short term. Although challenging, pursuing this policy will not have great costs and the potential benefits are significant.

# Section 7

## Conclusions and Recommendations

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This section presents R. W. Beck's overall conclusions and recommendations related to CalRecycle's waste tire market development program, drawing from the analyses presented in earlier sections. First, we present high-level conclusions regarding CalRecycle's progress to date in striving to achieve its goals and desired outcomes, while adhering to its guiding principles (as defined in Section 2). Next, we review the priority market segments for expansion and diversification and present recommendations for program adjustments and budget allocations, assuming current legislative authority and funding levels. This includes recommendations related to new funding mechanisms including subsidies, grants, and loans evaluated in Section 6, as it was determined that these would not require new legislation to implement. These recommendations are intended to help guide CalRecycle staff and management as they develop the next Five-Year Plan beginning in late summer 2010.

Finally, we present recommendations based on the findings of Section 6 related to potential new policies. These policy-related recommendations are intended to provide CalRecycle with additional options for more fundamental changes to the framework that currently governs waste tire management in California. Since these options would require new legislation and/or regulations controlled by other agencies, they are presented separately from the first set of recommendations which CalRecycle alone can implement immediately. We describe these policy-related recommendations and contrast them with the detailed programmatic recommendations at a high level by presenting three broad scenarios for moving forward:

Scenario 1) Adjust current waste tire market development programs to maximize diversion, assuming no changes to current legislation and funding levels;

Scenario 2) Complement current programs and policies by pursuing new mandates, funding levels, or other policies to further increase diversion; and

Scenario 3) Seek to shift the current legislative framework entirely by pursuing adoption of extended producer responsibility legislation.

### ***CalRecycle Progress to Date***

Begun in the early 1990s, the CalRecycle waste tire market development program has steadily evolved to address changing market opportunities and conditions, while seeking to increase program effectiveness and efficiency. The program has directly contributed to the development of a highly diversified and dynamic infrastructure for producing, marketing and installing a wide range of tire-derived products, and other CalRecycle tire programs have helped develop a robust tire collection, hauling and processing infrastructure to supply those markets. The program is one of the best-funded and consistently-resourced recycling market development programs in the nation. Since 2001, the overall tire program has been funded with a \$1.00-per-tire fee (of a total \$1.75 assessed on new tire purchases). CalRecycle's overall tire program is currently budgeted through the 2012/13 fiscal year at an average annual budget of more than \$40 million, with \$18.5 million on average allocated to activities defined in this report as market development. The next Five-Year Plan to be adopted in 2011 will provide projected budgets through 2015, at which point current legislation calls for an approximately 25 percent reduction in CalRecycle's overall waste tire management budget.

The program's key strengths are its sustained funding that allows for uninterrupted industry support, staff, and contractor resources; its regular review and adjustment of programs through the biennial Five-Year Plan preparation process, and its dedication to transparency and ongoing stakeholder engagement. For a variety of reasons, CalRecycle does not appear to be on track to achieve its 90 percent diversion target, and the recommendations contained herein are intended to result in a more effective and efficient program, with a greater chance of achieving its goals in the future. Areas highlighted for improvement include the need for greater coordination across programs in planning and executing activities, the need for stronger performance measurement activities; and the need to adopt and articulate a compelling strategic approach that can garner greater involvement and buy-in by all stakeholders and better focus the wide range of efforts underway addressing the key barriers that restrict market growth and diversification.

Presented below are more in-depth conclusions regarding CalRecycle's progress to date in achieving its diversion goal, broader market development goals and desired outcomes, and adherence to several guiding principles. This is then followed by recommendations for moving forward.

### The Overriding 90 Percent Diversion Goal

As shown in Figure 7-1, in the first decade of tire program activity the diversion rate increased from about 30 percent to about 70 percent, largely through gains made in the use of tire-derived fuel and tire-derived aggregate used in landfill civil engineering applications, as well as a nascent ground rubber industry that grew and contracted largely in response to federal market development activities (i.e., an aggressive mandate to use ground rubber in federal highway construction, which was subsequently eliminated). In the second decade, since 2000, the overall waste tire diversion rate has hovered at just over 70 percent, although the volume of tires diverted steadily increased as waste tire generation grew. Simultaneously, the market has diversified with a range of new products using ground rubber gaining ground. While a variety of factors influence industry and diversion trends, CalRecycle programs have clearly played an important role in this trend, as described below.

**Figure 7-1. Waste Tire Diversion and Disposal Trends**

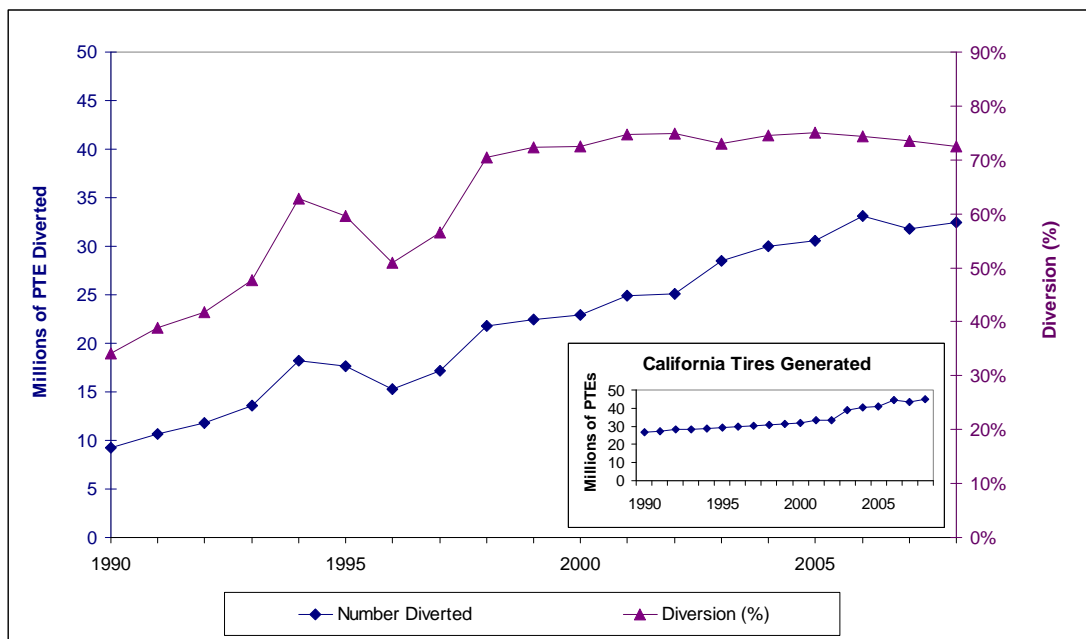
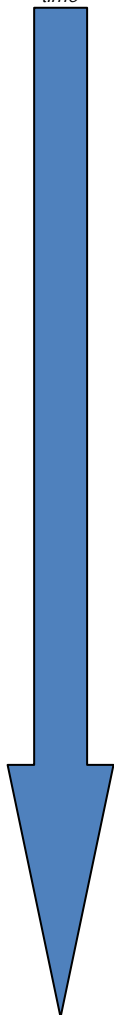


Figure 7-2 (on the following page, below) presents a formalized illustration of CalRecycle's general strategy for waste tire market development. While not previously articulated in this fashion, the figure is intended to illustrate the basic strategy embodied by CalRecycle programs, and the rationale for many program adjustments over the past 10 years, as presented in the biennially published Five-Year Tire Plans. In essence, the strategy is to identify and nurture viable uses for waste tires through the application of five market development mechanisms (as shown in column 3 in Figure 7-2), with the aim of moving products and applications toward full commercial acceptance, while steadily reducing state costs and resources, with the expectation that ultimately the markets and industry dynamics will take over and the state can gradually play a reduced role.

**Figure 7-2. CalRecycle Market Development Strategy**

*Use state resources to efficiently catalyze commercial adoption of viable products and applications over time.*

Product Stage	Typical Strategic Use of Market Development Mechanisms at Each Stage <i>(Varies by Product in Practice)</i>		CalRecycle Cost Range (\$ per Tire Diverted)	Approximate Current Status of Market Segments
Unproven		<b>Research and Development</b> <i>to identify prospective TDPs, document their potential and identify challenges</i>	<b>High</b> <i>Initial projects may result in no diversion</i>	<ul style="list-style-type: none"><li>• Civil Engineering<ul style="list-style-type: none"><li>○ Commercial and residential retaining walls</li><li>○ Highway sound barriers</li><li>○ Septic systems</li></ul></li></ul>
Demonstrated		<b>Technical Assistance and Funding</b> <i>to show consumers that TDPs are feasible and to document cost and performance</i>	<b>High</b> <i>Must cover many costs</i>	<ul style="list-style-type: none"><li>• Ground Rubber<ul style="list-style-type: none"><li>○ Molded/Extruded Products (feedstock conversion and newly emerging products)</li></ul></li><li>• Civil Engineering<ul style="list-style-type: none"><li>○ Transportation - light rail vibration attenuation</li><li>○ Landfill - leachate collection system &amp; operations layer</li></ul></li></ul>
Proven		<b>Technical Assistance, Education, and Outreach</b> <i>to encourage and help prospective customers to try TDPs and address supply side barriers</i>	<b>Medium – High</b> <i>Must cover many costs, but project sponsors begin to take on more cost</i>	<ul style="list-style-type: none"><li>• Civil Engineering<ul style="list-style-type: none"><li>○ Transportation - retaining wall</li><li>○ Transportation - lightweight fill for landslide repair &amp; embankments</li></ul></li><li>• Exported Waste Tires</li></ul>
Maturing		<b>Technical Assistance, Education, and Outreach</b> <i>to encourage widespread commercial adoption</i>  <b>New Policy Adoption</b> <i>to institutionalize use via specifications or legislation</i>	<b>Low – Medium</b> <i>Programs tapered to reduce state support</i>	<ul style="list-style-type: none"><li>• Ground Rubber<ul style="list-style-type: none"><li>○ RAC</li><li>○ Turf and athletic fields</li><li>○ Playground coverings</li><li>○ Mulch/bark</li><li>○ Select, established molded/extruded products</li></ul></li><li>• Civil Engineering - landfill gas collection systems</li></ul>
Adopted		<b>Outreach</b> <i>as needed to help maintain and encourage ongoing use</i>	<b>Zero – Low</b> <i>state gradually weans market of funding support</i>	<ul style="list-style-type: none"><li>• Alternative Daily Cover</li><li>• Tire Derived Fuel</li><li>• Retreading</li><li>• Reuse</li><li>• Exported Used Tires</li></ul>

## Market Development Goals and Desired Outcomes

As described in Section 2, at the outset of this project CalRecycle management and staff agreed on a set of goals and desired outcomes that describe the ultimate market conditions their programs are striving to achieve. Following is a synopsis of how current conditions stack up against these goals, and the role CalRecycle's program has played:

***The first and most fundamental CalRecycle goal is to promote the development of long-term, sustainable and diversified markets for California tire-derived products (TDPs).*** Associated

### **Goal 1: Develop Diversified Market Demand**

#### Desired Outcomes:

- Well-managed, efficient TDP producers making a wide variety of TDPs with strong consumer demand;
- Myths and misconceptions are eliminated and replaced with factual information on the pros, cons, and uses for both high volume and high value tire-derived products;
- Standards and specifications for TDPs are well established and accepted;
- Diversion goals are achieved with demand and supply in balance coupled with acceptable quality and price terms;
- Price signals provide an incentive for recycling to generators, haulers, processors, and end-users;
- Costs, revenues and general market conditions allow firms to operate profitably;
- Markets are sustainable without ongoing government programs.

outcomes are listed in the box at left. As shown in Table 7-1 below (on page 168), California waste tires do flow to a diversified range of markets.

CalRecycle programs have played a role in the growth of most market segments. CalRecycle research programs helped to document the market potential and use of TDF in the early 1990s, and later in the decade helped support use of tires in landfill TDA applications and alternative daily cover operations. More recently, CalRecycle programs have targeted expansion of ground rubber markets, TDA in road and other construction, and infrastructure development through funding, business and technical assistance, education and training and outreach and promotion activities. While some of this growth would likely have occurred without CalRecycle programs, it is clear that without CalRecycle support for these market

segments the waste tire diversion rate would be far lower and the risk of accumulating illegal and unsafe tire stockpiles would be much higher.

Despite the positive long-term trend of increasing volumes flowing to different markets, the diversion rate has held essentially stagnant for the past decade. The current strategy has the merit of seeking sustainable, lasting growth that is grounded by market forces, but has the drawback of being an inherently long-term approach. By optimizing this approach (based on the recommendations below), CalRecycle can ensure that state resources are used as effectively as possible to expand the priority market segments of TDA and ground rubber. However, achieving the 90 percent diversion by 2015 goal may require additional funding assistance, subsidies, mandates, and/or other policies that essentially "force" market expansion ahead of what would otherwise be achieved through the current, more market-based approach. The pros and cons of such optional new programmatic and policy options are described in Section 6, with recommendations for new policy consideration provided later in this section.



In relation to the desired outcomes associated with developing diversified market demand (as listed in the box above), CalRecycle has sought to assist TDP producers to increase their efficiency and profitability through the TBAP program and provided loans and/or grants to them (along with processors) beginning in the late 1990s (direct grants were discontinued in 2008). CalRecycle has sought to address “myths” and misconceptions regarding TDPs in a variety of ways, such as the ongoing study on potential health impacts of rubber infill used in athletic fields. However, given the state’s charge to objectively address potential environmental and human health concerns, it is obligated to take a cautious and studious approach that cannot provide information as quickly as some market players would like. And, while CalRecycle has compiled performance and cost information on certain TDPs, it has yet to compile thorough information or to disseminate it at a level commensurate with its potential, given its funding and activities related to TDPs.

Where it has focused on particular applications, such as TDA and RAC, CalRecycle has contributed to the establishment of standards and specifications. However, some industry stakeholders point to a need for greater quality standards for ground rubber feedstock, and this has not yet been addressed.

The supply infrastructure for producing tire-derived rubber feedstock has steadily grown in the past decade, while remaining more or less in balance with demand. However, during periods of growth there is always a danger of an imbalance. While in 2008 there were some concerns raised about insufficient ground rubber supplies, there may be more risk now of a potential oversupply situation in coming years. With several new ground rubber producers, a sharp decline in demand could quickly alter the supply-demand balance and result in price declines and pressure on processors to adapt. Going forward, CalRecycle will need to monitor processor capacity and exercise caution in allocating grant and loan funds to stimulate development of additional processor capacity.

The last three desired outcomes listed in the “diversified demand” box above may prove the most challenging over time to both achieve and measure. While demand has grown for ground rubber and supply has expanded to meet the demand, waste tire generators, haulers, and processors see a conflicting range of price signals which only sometimes provide strong incentives to increase diversion and sometimes jeopardize the profitability of certain business operations. The existence of historically competitive landfill options, especially in Southern California, has been a major hindrance to recycling, as has, in recent years, the growing demand for waste tires in export markets. (It must be noted, however, that these outlets have also helped to provide incentives to guard against noncompliant tire stockpiles, which have accumulated in the past.) While several California processors and TDP firms are consistently profitable, many are not and must grapple with persistent cash flow, sales, management, and operational and other challenges that threaten consistent, strong profitability.

A key question related to California waste tire markets is: would waste tire markets continue without government programs? As discussed in Section 6 (under Option 2.2, reduced funding for state tire market development programs) CalRecycle has had a significant positive impact over the past two decades in expanding tire recycling markets and diversion levels, including key markets such as RAC and other ground rubber TDPs, TDF, and ADC (which account for nearly 20 million PTE diversion, or 44 percent of total generation). Also, CalRecycle is currently playing a primary role in catalyzing increased civil engineering uses and in maintaining and steadily expanding all ground rubber uses, while monitoring all uses and market trends. While market demand would continue at a base level without CalRecycle, its ongoing support addresses specific barriers as discussed throughout Section 4 and removing this support would surely have a

significant detrimental impact now and in the future. In a worst-case scenario, if current markets decline and CalRecycle could not promote alternative markets, it could possibly lead to a return to noncompliant stockpiles of tires that do not have an economical diversion or disposal outlet.

***CalRecycle's second goal is to promote the development of a long-term, sustainable supply infrastructure in California that efficiently and profitably produces high-quality raw materials to meet market demand.*** Desired outcomes are listed in the box at left. California does, in fact, have a highly robust waste tire hauling and processing infrastructure, and CalRecycle programs

have contributed directly to its development.

Between 1998 and 2004, the Commercialization Grant Program provided \$7.4 million in 40 grants, and since the dedicated Tire Loan Program was launched in 2008, four firms have received loans totaling more than \$3 million.

Since 2006, the TBAP program has provided over \$6 million in business assistance services to 39 firms, including over \$1 million in equipment grants for 12 firms during its first two cycles before equipment grants were discontinued. The industry is highly dynamic and some activity is sure to have occurred independent of CalRecycle, but CalRecycle's programs have also clearly played a positive role in assisting many firms. The TBAP program has continued to document the need for increased efficiency and improved operations, while providing a source of assistance in addressing such issues.

Important supply-related barriers do remain, however, that CalRecycle has not been able to overcome. These mainly involve delivery of TDA to remote, large projects and RAC in remote areas. In relation to the supply related desired outcomes listed in the box, hauling capacity is sufficient and adequate. There

## **Goal 2: Develop High Quality Supply to Meet Market Demand**

### Desired Outcomes:

- Sufficient, well-managed, efficient processors located where needed and able to produce consistent quality and quantity feedstock at acceptable cost;
- Adequate hauling capacity able to efficiently move supply into the marketplace;
- Standards and specifications established where needed and widely accepted; and
- Sustainable without government programs.

## **Goal 3: Grow and Balance Supply and Demand**

### Desired Outcomes:

- An effective market intelligence system provides all market players with equal access to information on price and demand trends, standards, policy, regulatory developments, and other pertinent information;
- All tire marketplace participants have the knowledge and skills needed to be effective in their respective roles and are aware of the uses for and benefits of TDPs;
- Processing and product production technologies are commercially proven, available and cost-effective; and
- Technology development keeps pace with changing needs of the supply/end use marketplace.

is a need for more widely accepted and adopted rubber feedstock quality standards, which remains unmet. As with TDP producers, some rubber feedstock suppliers appear to be highly dependent upon government programs, while others have demonstrated an ability to thrive independently of state support.

***The third goal is to foster information flow, knowledge transfer, and technology and product development to increase tire derived product demand and the supply that feeds it.*** Desired

outcomes are shown in the box at left. CalRecycle has recently expanded its market intelligence system to provide more in-depth information on market and industry trends. However, there remain gaps in information on price, technology, and other areas, and many industry players do not have equal access to such information. Myths and perceptions predominate in many arenas and there remains a need to provide objective information.

A key opportunity is to better leverage grants and other assistance to compile detailed TDP performance and cost information, as well as testimonials, and to use this information in targeted outreach and promotion, and education and training. CalRecycle has not made new technology development a priority. Rather, the focus is on selective development of products with a proven potential to become commercially viable. While this focus has served CalRecycle well in recent years, in the future, as established products run their cycle, it may be necessary to put more emphasis on development of new products and technologies, as well as feedstock conversion, to ensure that California tire-derived product processors, manufacturers, and consumers are aware of product and feedstock developments.

### Guiding Principles

In addition to the goals and desired outcomes described above, CalRecycle's tire market development program also seeks to adhere to several guiding principles, as described in Section 2.

CalRecycle has generally adhered well to the first guiding principle (Principle A). The Five-Year Plan effectively integrated market development activities with other, broader waste tire management needs, and in certain cases where potential conflicts may arise, CalRecycle has carefully sought to conduct research to ensure that decisions are made on objective grounds. For example, CalRecycle has commissioned research to document potential health concerns even in the face of industry demands for immediate endorsement of the safety of TDPs.

Guiding Principle B defines the proper role of the state in market development activities and states important principles to consider in implementing programs. Generally, CalRecycle's

**Guiding Principle A:** CalRecycle's waste tire market development program is part of a broader, statewide tire management strategy aimed at protecting public health and safety, conserving resources and protecting the environment, and developing markets to divert waste tires from landfills. Market development efforts should complement, not compromise, these broader goals.

programs have sought to address this principle, but additional adjustments are needed. Later in this section, recommendations are offered to adjust programs to target specific opportunities and barriers. CalRecycle has had some notable successes in building institutional capacity: the nascent acceptance of both RAC and select TDA applications within Caltrans, and partnerships with other organizations are

just two examples. However, there are many more opportunities for trade association and industry partnerships, as well as in-house staff development, that could both expand and strengthen state programs while further leveraging resources.

Points three through six under Guiding Principle B are perhaps the most challenging and controversial topics addressed in this program evaluation project. This report is a significant attempt to align programs with these principles and to address these issues.

**Guiding Principle B:** CalRecycle's role is to maximize the diversion of waste tires from landfills by building new market opportunities, enhancing existing markets, and removing barriers that retard private-sector market expansion and cause market instability. CalRecycle's role in this regard also includes:

- 1) Proactively motivating and supporting private and public stakeholders by investing in or promoting market development priorities;
- 2) Building internal and external institutional capacity that enables markets to adapt and thrive over time;
- 3) Operating at an appropriate scale needed to have the desired impact;
- 4) Targeting changes that would not have occurred without state programs;
- 5) Diverting additional tonnage from disposal, as opposed to moving materials from one market to another; and
- 6) Measuring outcomes and effectiveness to the extent possible and adjusting programs accordingly.

Guiding Principle C may never be possible to fully satisfy, because any government assistance program is bound to benefit some players in the marketplace more than others and may have unintended consequences. (In fact, the diversion goal ensures that, if successful, firms involved in diversion will benefit more than those involved in disposal.) In some cases, such as in the regulatory arena, government intervention may impede specific market activity while striving to achieve environmental or other objectives. Because of the nature of waste tires, there are strict permitting and site storage and transportation regulations in effect. While some processors have had challenges complying with these regulations, overall a sustained effort by CalRecycle's permitting and enforcement staff appears to be increasing the compliance rate.

CalRecycle is also evaluating options for adjusting waste tire storage requirements that hold the promise of addressing some key market development supply barriers, especially in relation to delivering large quantities of TDA to remote sites and storing supplies of ground rubber and other rubber feedstocks or products in order to align with market demand trends. However, strict storage regulations are central to addressing concerns related to fire risk, and therefore such compliance challenges are likely to continue to present a market development barrier for tire processors. Ultimately, addressing these barriers could be essential to expanding demand and

diversion to the nascent TDA civil engineering market.

**Guiding Principle C:** CalRecycle will strive to achieve its recycling market development goals in the least intrusive way possible and in a fair and equitable fashion, thereby cost-effectively utilizing program resources and providing assistance only to the extent needed to meet those goals. Likewise, CalRecycle's regulatory and enforcement activities will strive to achieve public health and safety objectives in a fair, equitable way and will not unduly constrain the marketplace.

One hallmark of CalRecycle's program is stakeholder input, and this has been key to CalRecycle's efforts to ensure that programs are equitable and fair. There are several examples where CalRecycle has modified programs to meet the objective of this principle. For example, while some firms have expressed dissatisfaction with the decision to eliminate equipment grants, this decision was made in part to address

concerns that the State was supporting some processors but not others, and because the loan program option provided a more market-based approach to achieving the same goal, while using state funds more efficiently. Similarly, the RAC and TDP grant programs have been adjusted periodically to reduce the funding per tire allowed. Moving forward, especially as some market segments begin to move toward maturity and widespread commercial adoption, this principle may increasingly become a factor that influences CalRecycle programs.

## ***Program Recommendations Assuming Current Funding Levels and Legislative Authority***

Below are recommendations for CalRecycle's waste tire market development program, assuming current funding levels and program authorities remain in place. First, we present recommended priorities for market expansion. This is followed by a summary of recommendations and then a description and rationale for the recommendations, organized around each market development mechanism. This is followed by budgetary recommendations. In the subsequent section, we present recommendations related to potential new programmatic and policy options involving increased funding, mandates or other policies that would require legislation to implement.

### **Market Expansion Priorities and Targets**

Table 7-1 presents recommended market expansion priorities, along with 2008 and projected 2015 market use and market penetration estimates. It must be emphasized that these priorities are not intended to express any type of value judgment regarding which market segments are more desirable than others. Given CalRecycle's goals to build a diverse marketplace and to expand demand to allow achievement of the 90 percent diversion goal, the priorities are solely intended to indicate which market segments at this particular moment in time, should be focused on in order to move toward that goal.

Top priority expansion opportunities include RAC and use of TDA and transportation-related civil engineering projects due to their relatively large potential market size, relatively low penetration rate achieved to date, and potential to overcome barriers to expand demand. Landfill TDA is included because of the sizable potential for increased use of TDA in gas circulation projects as noted in Table 7-1, but also because of the *possible* potential for additional use in operational layers (which have significant barriers but which, if overcome, could potentially use large quantities of TDA). Molded and extruded products are listed as a top priority because of the significant potential growth, including the potential for new product development and siting of new manufacturing facilities in California. The projections in Table 7-1 are based on quantitative extrapolation of trends over recent years, modified to reflect short-term trends and anticipated activities. The projections assume that no future key threats, as discussed in Section 3, would result in a drastic reduction of any established market segment. While overall diversion increases from 32.4 to 42.8 million PTE under these projections, the diversion rate increase to 81 percent is moderated by projected increases in waste tire generation.

**Table 7-1. Market Expansion Priorities Along with Current and Projected Market Use and Penetration Estimates (Assuming Current Legislation and Funding Levels Remain)**

Expansion Priority Level							
			Low	High		Low	High
<b>Top Priority</b> Focus resources on these markets to as great an extent possible to support maximum market expansion.	GR - Rubberized Asphalt Concrete (RAC)	4.32	12	17	6.1	17	24
	GR - Molded and Extruded	1.15	23	29	2.0	39	49
	GR - Loose-fill Playground/Bark/Mulch	1.15	15	26	2	27	44
	CE - Transportation - lightweight fill <sup>1</sup>	0.73	9	10	1.9	24	27
	CE - Transportation - retaining wall <sup>1</sup>	0.00	0	0	1.0	22	33
	CE - Transportation - light rail <sup>1</sup>	0.00	0	0	0.1	50	100
	CE - Landfill use <sup>1, 2</sup>	2.06 <sup>3</sup>	52	69	2.0	51	67
<b>Medium Priority</b> Focus resources on these market segments to ensure continued strong sales and, to the extent possible, continued growth (for the listed ground rubber products) or to nurture market segments with long-term potential (for the civil engineering applications listed).	GR - Turf and Athletic Fields	2.44	49	61	3.9	77	97
	GR - Pour-in-place Playground	0.45	6	9	1.2	18	25
	GR - Other	0.54	25	36	0.09	42	62
	CE - Other Civil Engineering (septic, residential retaining wall, related)	0.00	0	0	0.0	0	0
	Other Uses (includes agriculture and cut/stamped products)	0.08	4	8	0.1	5	10
<b>Low Priority</b> Monitor their use and as needed and possible, continue to take actions to allow the uses to continue, while not impeding their use.	Retreading	4.42	85	92	4.5	87	94
	Domestic Used Tires	1.85	77	84	2.0	85	93
	Alternative Daily Cover (ADC)	2.06	5	6	2.1	5	6
<b>No Priority</b> Take no action to promote at this time.	Tire Derived Fuels (TDF)	7.50	38	50	7.7	38	51
	Exported Waste Tires	2.19	22	31	3.7	37	52
	Exported Used Tires	1.51	79	84	1.6	84	89
<b>Totals</b>		<b>32.4</b>	<b>20</b>	<b>26</b>	<b>42.8</b>	<b>26</b>	<b>34</b>
<b>Effective Diversion Rate</b>		<b>72%</b>			<b>81%</b>		

<sup>1</sup> Estimated market size is derived from Kennec estimates.

<sup>2</sup> Landfill civil engineering market size estimate is for landfill gas and leachate recirculation applications only. An additional potential use, in operational layers, is not listed as a priority because of significant regulatory and supply barriers. Despite these barriers, potential for this use supports listing landfill TDA as a priority market segment.

<sup>3</sup> This 2008 landfill civil engineering use estimate should not be used as a benchmark for evaluating future progress as it was necessarily based on reported usage that could not be validated by CalRecycle, and which in some cases may not be consistent with CalRecycle defined civil engineering applications. CalRecycle intends to define specific landfill civil engineering applications for TDA and establish a confirmed baseline when conducting the 2010 market analysis in early 2011.

<sup>4</sup> 2015 projected market use assumes: current trends continue; CalRecycle implements the recommended program adjustments presented in this section; and no major threats to current diversion levels materialize.



Although the projections are subject to many sources of uncertainty, R. W. Beck finds the overall conclusion—that CalRecycle is not likely to achieve its 90 percent diversion goal without significant new funding, subsidies and/or mandates—is sound.

While they are not covered in the recommendations, two potential adjustments to the 90 percent goal were identified that CalRecycle could consider. First, the diversion goal could be partitioned to reflect market development priorities. For example, of the 32.4 million PTEs diverted in 2008, about 19.2 million PTE (59 percent of diverted tons or 43 percent of total tire generation) were diverted through the markets currently identified as most desirable by CalRecycle (i.e., reuse, ground rubber, civil engineering, and other recycling). The remaining 13.3 million tons (41 percent of diverted tons or 30 percent of total tire generation) were diverted through less desirable markets (ADC and export) or through TDF, which CalRecycle is statutorily restricted from promoting. One option would be to set different targets for these two groups of diversion markets; for example, aim to shift specific percentages from less desirable to more desirable over time. A second option consistent with the first option would be to adopt a zero waste tire goal in lieu of the 90 percent diversion goal. In either case, CalRecycle could also reinforce the goal that 100 percent of all waste tires be managed properly in accordance with state regulations.

Note that, if not for the statutory ban on CalRecycle support for TDF, that market segment would have been classified as a medium priority, given its important role as a sustainable, economic market for waste tires. As noted in Sections 3 and 6, U.S. EPA’s proposal to redefine whole tires combusted in cement kilns as municipal solid waste could potentially greatly reduce the amount of California tire rubber flowing to this well-established end use market.

## Summary of Recommended Priority Programmatic Adjustments

Table 7-2 lists broad recommendations for CalRecycle’s tire market development programs, assuming that current funding levels and legislative authorities remain in effect. Following the table, we describe these in more detail, along with a rationale and identification of specific priority options for consideration under each recommendation.

The recommendations were developed by considering the analysis presented in Sections 4 and 5, as well as the analysis of funding assistance options presented in Section 6 (options determined to not require new legislation to implement). The recommendations were developed by qualitatively considering the identified options and the three criteria below (the same criteria used in Section 6 to evaluate policy options):

1. ***Likely Diversion Impact***—We first considered how activities could best target top priority market segments and key barriers, and also considered based on lessons learned in past performance, which approaches are most likely to maximize diversion increases and diversification;
2. ***Relative Cost and Stakeholder Impacts***—We next considered costs and stakeholder concerns. The cost analysis was necessarily more qualitative than that presented in Section 6, but still sought to identify the biggest “bang for the buck,” while avoiding negative impacts to any particular group;
3. ***Implementation Feasibility and Issues*** —Finally, we considered overall implementation feasibility and issues, including consideration of CalRecycle’s goals, desired outcomes, and guiding principles as described above and in Section 2, as well as potential synergies across mechanisms and programs.



Appendix I summarizes how recommendations are supported by the criteria above. This process resulted in the recommendations presented below. These recommendations represent R. W. Beck’s perspective on the “best” course forward at this time. Subsequent to describing our recommended priorities below, we present broad recommendations for allocating budget by market development mechanism. While ideally all of the recommendations would be implemented, in practice further prioritization will be required during the planning process. The recommendations are presented at a “high level,” with the understanding that the process of determining specifically which options will be implemented, specifically how much budget will be allocated, and specifically how each program or activity will be implemented is left to CalRecycle management and staff to determine through the next Five-Year Plan process and through internal discussion and management decisions. Later in this section we present recommendations related to implementing new funding mechanisms, mandates, and other policies that require new legislation.

**Table 7-2. Programmatic Recommendations Assuming Current Funding and Legislative Authority**

<b>Mechanism</b>	<b>Broad Programmatic Recommendations</b> <i>(See text for detailed priority options for consideration under each recommendation)</i>
Planning & Performance Measurement	<ol style="list-style-type: none"> <li>1. Continue to conduct a transparent Five-Year Plan development process with ample opportunity for stakeholder input.</li> <li>2. Formalize the strategic framework used in Five-Year Plans.</li> <li>3. Coordinate evaluation and planning activities across programs.</li> <li>4. Strengthen objective setting and performance measurement activities.*</li> </ol>
Research and Development	<ol style="list-style-type: none"> <li>5. Maintain a prioritized research agenda that includes activities across programs and that identifies dissemination and follow-up needs.</li> <li>6. Enhance the annual tire market studies by adding elements that support the Five-Year Plan.</li> <li>7. Establish a new research activity to compile TDP performance and cost information on an ongoing basis from CalRecycle programs, original research, and other sources.*</li> <li>8. Allocate a portion of the market development budget for research on potential new products and technologies that utilize waste tires.</li> </ol>
Funding Assistance	<ol style="list-style-type: none"> <li>9. Continue to refine current consumer grant programs to maximize cost effectiveness and target top-priority expansion and diversification opportunities.</li> <li>10. Shift a portion of funds currently allocated to RAC use grants to support a new TDA funding program.*</li> <li>11. Establish a new Market Development Innovations Grant Program.</li> <li>12. Continue to allocate budget for the Tire Equipment Loan Program, subject to demonstration of the need for any additional proposed production capacity.</li> <li>13. Streamline reporting requirements for funding recipients, but strengthen requirements to participate in surveys and case studies.</li> </ol>
Business & Technical Assistance	<ol style="list-style-type: none"> <li>14. Continue to focus TDA and RAC technical assistance on top-priority opportunities and barriers.</li> <li>15. Continue to offer TBAP direct business assistance services, while adjusting program rules that determine how to prioritize applicants.</li> <li>16. Increase stakeholder buy-in and participation in TBAP sectorwide projects.</li> </ol>

Mechanism	Broad Programmatic Recommendations (See text for detailed priority options for consideration under each recommendation)
	17. Coordinate technical assistance activities across programs and other market development mechanisms.*
Education and Training	18. Expand education and training activities and continue to focus them on top-priority market expansion opportunities and barriers. 19. Maintain a consolidated education and training agenda that is coordinated and synchronized with technical assistance, outreach and promotion activities. 20. Provide a central access point that consolidates education and training resources.* 21. Expand partnerships to leverage and institutionalize education and training programs.
Outreach and Promotion	22. Develop a coordinated outreach and promotion plan that integrates activities and performance measurement across programs. 23. Maximize efforts targeting high-impact audiences and market segments. 24. Expand and strengthen CalRecycle outreach and promotion vehicles targeting key customer groups.* 25. Increase partnerships within California and externally to promote TDP sales.

\* Top priority recommendations for new or adjusted current activities in each category are identified with an asterisk.

## Planning and Performance Measurement

CalRecycle's primary planning activity is biennially updating of the Five-Year Tire Plan, as required by statute. Market development is one component of the plans, although market development activities are also included in the "research" section, and some activities in both sections are not market development-oriented (e.g., promotion of proper tire maintenance as a source reduction strategy). CalRecycle has successfully used the Five-Year Planning process to review its programs, air the pros and cons of current programs and proposed adjustments, and to provide a written plan documenting planned activities and budgets. The process has been highly transparent, with multiple drafts shared publicly and many opportunities provided for stakeholders to offer suggestions, react to conceptual ideas, and to provide specific comments on final plans and budgets. The plans, however, lack certain key strategic elements, and the planning process, to a high degree, is built around existing programs rather than a systematic, market-based approach to prioritizing opportunities and evaluating alternative courses of action. This programmatic approach to planning has permeated implementation as well, and greater coordination across programs holds the promise to achieve economies of scale while increasing overall effectiveness. While the plans include an evaluation component, the objective-setting and performance measurement elements and activities could be strengthened. CalRecycle has also sponsored periodic independent program reviews, including this evaluation. A previous evaluation study was conducted in the late 1990s. Planning and performance measurement is not specifically identified in Five-Year Plan budgets.

***Strategy: Enhance the Five-Year Plan development process used in previous years by formalizing the underlying strategic approach to achieving specific priority targets; coordinating evaluation, planning and implementation activities across programs and strengthening objective-setting and performance measurement elements.***

Recommendations follow below.

**1. Continue to conduct a transparent Five-Year Plan development process with ample opportunity for stakeholder input.**

The Five-Year Planning process is a hallmark of CalRecycle's approach and has served it well. Especially with CalRecycle's new structure, continuing to provide ample opportunity for stakeholder involvement during the development of the plan is essential.

**2. Formalize the strategic framework used in Five-Year Plans.**

While a wealth of strategic thinking has been articulated verbally to justify previous Five-Year Plan components, it has not always been articulated in the plan itself. Also, there is no single framework used to identify and evaluate optional adjustments. Top-priority options for CalRecycle consideration include:

- a. Open the plan with a strategy section defining goals, desired outcomes, principles, basic priorities, and the general strategic approach to recycling market development that will serve as the foundation for biennial updates;
- b. Organize plan sections around market development mechanisms as defined in this report, rather than current programs, or at least separately identify within each program the activities and budget related to each mechanism;
- c. Identify the strategy for applying each mechanism to target top priority expansion opportunities and barriers and articulate how each of the mechanisms will work together to achieve objectives, based on an overarching strategy (e.g., the one described in Figure 7-2 above). For example, the plan should seek to capture the powerful synergies of combining broad outreach materials and activities (with common messages and information interfaces) with more focused one-on-one outreach that offers education, technical assistance and funding to promote adoption of specific products and implications;
- d. Use a common template for defining and evaluating proposed new programs and activities, as well as adjustments to existing programs and activities, to ensure market expansion, barriers, CalRecycle goals, and guiding principles are considered (see the example provided in Appendix F); and
- e. Handle activities that do not have a market development element (e.g., source reduction) under a separate section of the Five-Year Plan.

**3. Coordinate evaluation and planning activities across programs.**

CalRecycle planning is currently organized around established programs or activities. While lead staff do consider broader strategic issues and coordinate efforts with one another, the fact that these efforts are organized around established programs/activities that may focus on only one or two market development mechanisms makes cross-program strategizing more difficult. Coordinating activities across programs and considering application of each market development mechanism may take a little more time up front, but holds the promise of reducing costs through increased economies of scale and effectiveness, while also building greater awareness and buy-in among CalRecycle staff and contractors regarding the overall program. This could be accomplished by assigning planning responsibilities in a way that encourages cross-program strategizing, for example, by:

- Assigning a single lead person to coordinate the overall plan for each market development mechanism;
- Assigning small groups to harmonize program-specific suggestions into mechanism-specific strategies;

- Requiring program staff to prepare plans that separately identify use of each market development mechanism; or
- Assigning one external expert with the appropriate skills and expertise related to each mechanism to review and comment on draft sections with an eye towards overall strategy coordination and integration.

#### **4. Strengthen objective setting and performance measurement activities.\***

This is identified as a high priority recommendation because it would help to further tie planning to outcomes across programs, in a strategic way. Defining measurable objectives that support overall market development goals, and developing and implementing a plan for tracking and measuring performance, adds time and a degree of cost. However, the benefits can pay dividends on the added cost. CalRecycle currently includes evaluation and measurement of market development programs and activities in the Five-Year Plans, and has a variety of performance measurement activities for its programs. However, objectives and outcome-oriented performance measures are not always identified and are not necessarily correlated with overall program market expansion and diversion goals. Top-priority options for strengthening these activities include:

- a. Separate out performance measurement and evaluation as a separate category within market development programs in Five-Year Plan budgets and allocate an appropriate amount of budget and dedicated staff time. This overt recognition of measurement costs will help staff to view it as an important and integral part of program activities;
- b. Require all programs and activities in the Five-Year Plan to identify measurable objectives related to both objectives and performance measurement (e.g., number of potential customers contacted, number of firms provided with technical assistance) and market expansion targets (e.g., increased sales of certain market segments by certain percentages or tons per year). The measures should directly relate to the identified strategy and objective of each activity. As appropriate, the plan should include dissemination and/or follow-up to ensure that the potential benefits of the activity are realized in practice;
- c. Establish a single, consolidated system for tracking performance measures and publish an annual or biennial set of tables summarizing statistics in a template that can be updated and tracked over time. For example, responsibility could be assigned to a single person who could proactively obtain data from program staff and use simple spreadsheets (based on a carefully developed template) to track data and prepare periodic reports.

### **Research and Development**

CalRecycle research and development activities generally fall into three categories: Research and development to identify and/or evaluate emerging products or technologies that utilize waste tires; research related to market trends and CalRecycle programs; and ad hoc research addressing key issues. The current Five-Year Plan allocates an average of \$840,000 to market development research activities through 2013/13, or about 4.5 percent of the total market development budget as it is defined in this report.

CalRecycle R&D activities aimed at new product and technology development has been effective over the long term. Research on RAC, TDF, and landfill civil engineering applications in the 1990s, for example, helped lead to significant expansion of those market segments, and research on transportation-related TDA applications in the early 2000s appears ready to reap benefits

through likely expansion of TDA use in retaining walls by Caltrans and in landslide repair by local agencies. Ongoing and planned related research includes updating data on landfill civil engineering applications and providing data on paving applications that are emerging in California (e.g., terminal blend). Research projects also were conducted to evaluate the current status of emerging technologies in the late 1990s, such as pyrolysis and devulcanization. Some research projects have provided information relevant to the development of ground rubber production as well (e.g., a report on managing fiber and steel residuals), although this work may not have been publicized sufficiently to have a significant impact. In recent years, CalRecycle has placed a low priority on basic research to identify and characterize potential new products and technologies in lieu of focusing on early-stage products that have already been proven to have commercial potential.

In the area of market research, CalRecycle has long published an annual Waste Tire Market Report that tracks the disposition of California waste tires by market segment. In 2009 the methodology and reporting template for these annual reports was enhanced and the reports were expanded somewhat to discuss key trends. While the reports provide a solid basis of information on broad trends by market segment, the current format does not include identification of changes in market expansion opportunities and barriers that is needed for the recommended Five-Year Plan strategic planning framework discussed above. Further, the reports do not provide analysis of TDP consumption trends and projections, which would be useful for evaluating the need for funding incentives for specific product types.

CalRecycle ad hoc research projects have provided a wealth of information on a wide range of topics related to tire recycling market development, including evaluation of the potential for using ground rubber in new tire manufacture and, most recently, investigation of the environmental and human health impacts of select TDPs. These research projects fill important information gaps and may be highly effective in addressing specific market barriers and needs. However, the projects are often time-consuming to budget for and commission and follow-through to publicize and implement findings could be stronger.

***Strategy: Adopt an integrated, systematic approach to defining a research agenda that ensures top-priority research needs are met, resources are available to address key issues as they arise, and research results are disseminated and followed up as needed to maximize benefits.***

Recommendations follow below.

**5. Maintain a prioritized research agenda that includes activities across programs and that identifies dissemination and follow-up needs.**

This recommendation builds on #3 above, and could be implemented as part of the Five-Year Plan development process, but should be updated on an ongoing basis as needed. The research agenda should not limit flexibility to identify and pursue research needs as they are identified, but should establish priorities and a common template for identifying objectives, dissemination plans and follow-up needs (coordinated with other market development mechanisms and activities as appropriate). Top-priority options for consideration include:

- a. Continue to allocate funding for TDA and new paving applications, as well as other areas as covered in the recommendations below;
- b. Include a budget allocation for ad hoc research needs that may arise between Five-Year Plan editions; and
- c. Include budget allocations for the specific research needs addressed in Recommendations 6-8 below.

**6. Enhance the annual tire market studies by adding elements providing information that supports the Five-Year Plan.**

The annual Waste Tire Market Studies are currently focused on quantifying the generation and flow of California tires into different market segments. Because of overlapping research needs, the reports could be efficiently augmented to provide information that is needed for the Five-Year Planning process. To reduce costs, these additional elements could potentially be prepared biennially to support Five-Year Plan updates, if necessary, although this may result in missing important industry changes between updates. Also, by gradually moving the research and report preparation activities in house, CalRecycle will help build staff capacities and a broader understanding of market trends. Top-priority options for biennial updates include:

- a. Update the list of priority market expansion opportunities and key barriers to support evaluation of current and new activities;
- b. Provide a short update on the current balance between supply and demand for use in evaluating equipment loan applications (See recommendation # 12 below) and in overall market development strategy refinement. The update would describe recent or expected expansions or contractions in general processing and ground rubber production capacity, TDP production capacity and overall market demand, and identify issues of concern such as the potential for oversupply situations or supply shortages. The analysis can yield important information regarding regional infrastructure differences and needs, although some of this information may not be appropriate for publication since it may allow for inferences about particular company operations that dominate in a given region. This balance is constantly in flux and is challenging to document due to company concerns over confidentiality, but CalRecycle should seek to stay on top of supply and demand trends to the extent possible;
- c. Develop and implement a protocol for evaluating whether specific TDP categories need funding subsidies. A relatively low-cost option would be to document products that are widely sold in other states without funding subsidies through discussions with producers, industry experts and state counterparts, although this would miss differences in state markets and would not specifically research state-specific barriers that might be addressed through state programs. Such research could potentially be conducted in partnership with the U.S. EPA , other states, or trade associations. A more costly and complex, but potentially more useful approach, would be to develop a protocol for estimating total sales of each TDP market segment in California (as opposed to tracking which markets California tires currently are used in). Such a study would likely require, however, extensive and costly primary research activities; and
- d. Consider enhancements to the rules, regulations, reported information and enforcement related to the Waste Tire Manifest System, to investigate whether the system could be modified in order to provide more thorough and timely market information. While providing market information is not the primary objective of the system, addressing inconsistencies in the system's use could greatly aid in analyzing current market trends and flows.

**7. Establish a new research activity to compile TDP performance and cost information on an ongoing basis from CalRecycle programs, original research and other sources.\***

This is identified as a priority recommendation because clear, defensible information on TDP cost and performance it is so critical to overcoming key barriers. While CalRecycle has



obtained detailed cost and performance data on some applications (e.g., certain TDA and RAC applications, and some TDPs), there is a need for additional and updated information on an ongoing basis. As importantly, there is a need to consolidate the information for better accessibility, and to present it in a concise, effective way suitable for a range of different audiences and uses as described elsewhere in these recommendations. Top-priority related options include:

- a. Assign one or more individuals to proactively obtain data from other program staff, then compile and maintain it in a common format (such as simple spreadsheets using carefully developed templates), possibly in connection with the performance tracking measures described under Recommendation 4c above;
- b. Leverage grant programs by refining required survey questions and by conducting a specified number of case studies annually that compile key performance and cost data in a common format, and by providing specific verbiage and/or signage for posting at grant project sites that conveys documented product benefits and information on product availability;
- c. Coordinate this function closely with outreach and promotion, and with education and training to ensure that these activities use the latest data and involve individual staff or other outreach experts for the purpose of drafting materials in lay terms based on technical data;
- d. Specific priority topics to consider covering in the activity include:
  - Documenting life-cycle costs and comparing them to initial costs
  - Comparing TDP cost and performance with key competing products for all of the above areas
  - Documenting information related to key product claims and concerns
  - Continuing to document environmental health and safety concerns related to TDPs
  - Documenting the recyclability of TDPs
  - Analyzing the life-cycle greenhouse gas and other environmental impacts of TDPs

**8. Allocate a portion of the market development budget for research on potential new products and technologies that utilize waste tires.**

In recent years CalRecycle has not made identification and development of as-yet unproven TDPs and applications a priority, and has instead focused on moving toward wider acceptance of several early-stage products and applications with proven potential. This strategy makes sense. However, the lead time to identify and develop new products is long, and the need for continued market diversification is critical. CalRecycle should consider allocating a small portion of its research portfolio to the continued evaluation and identification of potential new technologies and products. Recommendation #11 below provides details regarding possible means of funding research on new products and technologies. Additional options for consideration include:

- a. Identifying and characterizing the potential benefits and barriers to using ground rubber in established and new molded and extruded products, including plastic-rubber compounds, consumer products and intermediate products used in industry;
- b. Researching the potential for water quality management related TDA applications involving storm water runoff drainage and oil/sand separation applications. These applications have been identified by TDA program staff but not yet investigated in detail;
- c. Periodically updating an evaluation of the current status and potential of emerging technologies such as gasification, pyrolysis and devulcanization; and



- d. Partnerships with universities, think tanks, trade associations, the U.S. EPA, and other states to conduct basis research aimed at identifying potential new products and applications. (Intellectual property ownership issues would need to be addressed by investigating the potential for agreements such as licensing results for a period of time while ensuring technology diffusion.)

## **Funding Assistance**

Funding assistance accounts for the largest share of CalRecycle's waste tire market development budget. In the current Five-Year Plan, an average of approximately \$10.5 million per year is allocated to funding assistance through 2013/14, including RAC grants, TDP grants, and the Tire Loan Program, or about 57 percent of the total market development budget as defined in this report. These programs are in high demand, as they are consistently oversubscribed, and they have helped support dozens of local agencies purchase a wide range of TDPs. CalRecycle has made several modifications over the years in an effort to reduce the cost per tire of these programs and, in the case of RAC, to structure grants so first-time users receive higher funding than experienced users. This grant structure has not been applied to the TDP program. There is currently no prioritization among product types within the TDP program, or regions within any of the grant programs. Budget allocations are made as part of the Five-Year Plan development process, although adjustments are common based on demand for grants and availability of budget for redirection. There is currently no grant program available to promote TDA use. Grantees are required to submit final reports, but informational content is limited, compliance is modest, and comprehensive results based on completed grant projects are not regularly compiled. Follow-up surveys are conducted but, generally, grant results are not tracked as consistently as grant awards, in part due to the time lag and need for repeated follow-up to obtain desired information from grantees.

A fundamental issue related to funding assistance is the question of determining the extent to which a given program is catalyzing new, ultimately self-sustaining demand versus merely subsidizing demand that would disappear in the absence of state support. While a thorough assessment of this question for all market segments was beyond the scope of this study, the analysis in previous sections shows that: A) CalRecycle support has historically helped to catalyze demand for paving products, TDF and ADC, and is currently the prime factor driving growth in civil engineering application uses; and B) CalRecycle has and should continue to address this funding program concern by adjusting programs to reduce the cost per tire of funding programs, funding first-time use of products rather than ongoing use, and targeting specific expansion opportunities and barriers that have the potential for, but have not yet achieved, broad self-sustaining demand outside of state support in the future.

***Strategy: Provide funding assistance when and where money is most needed to overcome key market expansion barriers for the top-priority market segments, and target those funds where they can be most effective in expanding diversion and diversification.***

Funding-related recommendations that can be implemented under current program budgets and statutory authority follow below, based in part on the analysis presented in Section 6.

### **9. Continue to refine current consumer grant programs to maximize cost-effectiveness and target top-priority market expansion and diversification opportunities.**

As noted above, CalRecycle has made several adjustments to grant programs over time to better target funds and wean experienced TDP purchasers from ongoing state support. Following are additional top-priority options for consideration:

- a. Adopt a grant structure for the TDP grant program (and any new programs) similar to that currently used for RAC, in which purchasers who have never received grant funding receive priority and a higher level of funding than those that have received funding previously;
- b. Continue to adjust grant criteria to give priority to products and applications most in need of funding support to catalyze use, including:
  - Eliminate separate chip seal grant and RAC use grant categories, and instead offer a consolidated paving applications grant program and allow all paving applications to compete for grants, subject to criteria that establishes priorities based on: a) the amount of rubber used; b) the potential to catalyze statewide increased demand; c) the demonstration of approaches that address unique and demonstrated barriers; and d) the ability to encourage new users to purchase TDPs as opposed to experienced product users. This approach could provide funding for terminal blend applications, for example, without having to dedicate a specific budget to that purpose. Consider reducing the amount of funding per tire for targeted RAC grants.
  - In TDP grants, give priority to purchase of molded and extruded products with potential for large expansion (i.e., new and established products that have not previously been available with ground rubber content), and establish a lower priority for select product categories that are demonstrated to be well established (such as athletic fields). Recommendation 6 suggests a means of identifying such products; however, in practice it may be necessary to identify the entire molded/extruded category if a means of objectively identifying emerging TDPs with high growth potential in this category cannot be identified.
  - Adjust program rules for all consumer grants so that a jurisdiction may not receive more than one grant for a similar purpose, and to make first-time grantees a higher priority.
- c. Shift a portion of funding currently allocated to the current RAC use grant program in order to establish a new TDA funding program as described in the next recommendation.

**10. Shift a portion of funds currently allocated to RAC use grants to establish a new TDA funding assistance program.\***

This is identified as a priority recommendation because of the need for funding assistance in seizing the market potential of the TDA segment. Certain TDA applications such as local agency landslide repair, state use of lightweight fill in retaining walls and landfill gas projects are poised for wider acceptance and growth, and are good candidates for grants or other funding assistance programs aimed at encouraging government agencies and private firms to test them. A new TDA funding program could be made available to private landfill operators in addition to local agencies, and also to state agencies. Combining the new program with a broad outreach and technical assistance campaign could optimize the potential impacts. Section 6 analyzed three alternative funding assistance programs that could potentially be applied to TDA, as follows:

- a. Consumer grants targeting government and/or private sector TDA users—This approach would be similar to the current grant programs and has the advantage of using established grant administration systems, while also securing commitments from applicants to work with CalRecycle and provide data and case studies. At this stage in the growth of TDA, a grant program may be most appropriate as it can be quickly implemented without substantial start-up development time, and because a relatively small number of projects may be proposed.

- b. Consumer subsidies (rebate model) targeting TDA—This approach would establish a new system for reimbursing specified TDA consumers in specified project types. While it would have added costs to develop and implement, and may require new regulations, it has the advantage of sending a broad signal to many potential TDA users that a portion of their costs will be covered. After initial start-up, the system may have lower costs than grants, but may yield less performance and cost data. While this system may be most effective at a later date after TDA is more widely understood and a larger number of initial projects have been completed, we recommend that CalRecycle explore in more detail how such a program would be implemented and launch a pilot project in the short term. We recommend that initially the pilot program target local and state agencies, and possibly private landfill operators. Depending on the results, the rebate model may have advantages over grants for RAC and expanding molded/extruded products as well. The program also has applicability to provide individual consumers with retail rebates, and as CalRecycle gains experience with the rebate model it should consider options to partner with retail chains in implementing and promoting such a program. The main benefits of an individual consumer rebate program may be the synergies of co-promotion rather than increased sales possible through a relatively modest rebate program targeting products already benefitting from the advanced marketing efforts of major retailers.
- c. Transportation subsidies (rebates)—This approach is similar to Recommendation b above, but reimbursement is limited to transportation costs. We recommend that at this time, larger amounts of assistance through grants or rebates (beyond transportation costs) be provided to catalyze growth in TDA use. However, over time the program could reduce rebates to the point where only net transportation costs (compared to competing aggregate sources) are covered.

#### **11. Establish a new Market Development Innovations grant program.**

As described in Section 6, the Market Development Innovations grant program is intended to encourage innovative entrepreneurial activity by public and private entities. The program can be adjusted periodically as CalRecycle objectives and market conditions vary, and could be structured to allow for different financial terms to incentivize different results. For example, a project that has large potential upside but carries some risk could initially be structured as a loan, but with a commitment to convert the loan to a grant if certain conditions are met, with the understanding that grant proceeds would then be used to expand performance results even further. Or, ownership rights for new technology developed under the program might be assigned to the developer for a period of time, with the understanding that the technology would then become public, or licensed immediately with the potential for the grantee and/or CalRecycle to benefit financially. While CalRecycle would be limited under current legislation to certain terms and conditions, if successful, the program could expand and diversify in future years.

In the short term, it is recommended that CalRecycle allocate a portion of the funding budget, perhaps \$500,000 to \$1 million, for a pilot innovations grant program with the objective of encouraging public and private entities to propose projects that would expand and diversify demand for California waste tires. The solicitation should establish criteria that clearly provide CalRecycle with the leeway to not select any projects, or to negotiate alternative terms and conditions with proposers. Finally, the solicitation should start with short pre-proposal concepts of perhaps four pages maximum, with compelling concepts being invited to submit full proposals. This grant model is adapted from the Beverage Container Market

Development and Expansion Grant Program previously operated by the Division of Recycling, now part of CalRecycle.

**12. Continue to allocate budget for the Tire Equipment Loan Program, subject to demonstration of the need for any additional proposed production capacity.**

The Tire Equipment Loan Program has proven to be an effective means of supporting the expansion of ground rubber production capacity in a more market-based manner than outright grants. However, as supply and demand expand over time, the risk of inadvertently contributing to a supply glut will periodically be high. For example, the three most recent loans yielded a combined increase in ground rubber production capacity of 3.6 million PTEs per year, more than a 33 percent increase over the amount of tires used to produce ground rubber in 2008. While this large increase in capacity may be merited, it does raise the risk of a possible future glut should market demand abruptly decrease. Priority options to guard against this risk include:

- a. Annually or biennially evaluate priorities and eligible uses for loan proceeds based on the supply and demand balance analysis recommended to be included in future annual Tire Market Studies (see recommendation #6 above);
- b. Target loans to specific market needs, such as expansion of molded and extruded products with proven market potential or TDA supply projects or to address regional infrastructure gaps; and/or
- c. During periods where new ground rubber capacity is not needed, establish expansion in TDP production capacity as a priority or even exclusive allowed use of loan proceeds.

**13. Streamline reporting requirements for funding recipients, but strengthen requirements to participate in surveys and case studies.**

Top-priority options for consideration include:

- a. Increase the amount of data on cost and performance reported and compiled (including life cycle vs. initial purchase cost data);
- b. Allow grantees to fulfill reporting requirements by completing a standardized survey;
- c. Require in applications that grantees commit to participate in future case studies, including providing specified product performance and cost information;
- d. Add penalties to ensure compliance with reporting, such as disallowing future grants for a period of time;
- e. Consider assigning responsibility for grant reporting to the recommended new TDP cost/performance research function (See Recommendation 7); and
- f. Consider strengthening and increasing enforcement of requirements that grantees use California-generated tires during the term of the grant by auditing a small number of grantees each year and publicly identifying those found not to be in compliance.

**Business and Technical Assistance**

CalRecycle has three primary business and technical assistance programs: the TDA and RAC technical assistance programs, and the Tire-Derived Product Business Assistance Program (TBAP). Each of these programs also includes an outreach, education and research component, in addition to the primary technical assistance function. In addition, the Recycling Market Development Zone program provides assistance services to all recycling businesses located in one of the 40 designated zones, and the CalBis program provides siting and other assistance services to firms wishing to site new facilities in California. In the current Five-Year Plan, an

average of approximately \$4.6 million per year is allocated to business and technical assistance activities through 2013/14, or about 25 percent of the total market development budget as defined in this report.

The TDA technical assistance program consists of program staff plus a technical consultant. The program has pro-actively worked with Caltrans and local agencies to move several TDA civil engineering market segments down the product development track, with three top-priority segments now poised for maturation and wider acceptance (landfill gas, landslide repair and retention wall applications). The RAC program is similar in that it is run by dedicated program staff supported by a RAC technical assistance contractor. While early efforts targeted Caltrans, RAC use by the state is now accepted and efforts are focused on local agencies, especially those that have not previously used RAC and that face particular hurdles, such as small, remote communities. The TDA technical assistance has had reasonably good success in assisting agencies and projects to move forward; however, because the RAC program is linked to a grants program and involves a product that is regularly used in standardized applications (including by Caltrans), it has had more success in attracting local agencies and expanding use. The TDA program may be poised to follow a similar path, with the above priority market segments apparently poised for wider application after being successfully demonstrated and tested by multiple agencies and landfills.

The TBAP program has two components: business assistance grants and sectorwide projects. The business assistance grants provide a wide range of marketing, business operations, technical, and product testing assistance services directly to business participants. Because the program involves a large number of subcontractors providing services to businesses, while under contract to CalRecycle, the relatively new program is pushing the boundaries of state procurement and contracting regulations and marked a sharp departure from the Commercialization Grant Program, which it replaced. Consequently, CalRecycle, the contractor, and participating businesses have all had to play a role in the program's continual improvement as it has matured over its first three assistance cycles over the past four years. In a recent survey of participants, two of 22 respondents (nine percent) were critical of certain program aspects and lamented the loss of the equipment loan program, while 20 of 22 respondents (91 percent) said they plan to participate again in the future. The second TBAP component is the "sectorwide" projects that aim to strengthen the industry as a whole rather than working with one business at a time. Twenty projects have been launched, several of which are still ongoing, with objectives that involve:

- a. Testing and implementing outreach and marketing/sales support and/or providing targeted education and training;
- b. Providing market information; and
- c. Supporting CalRecycle programs through support such as this evaluation study.

While sectorwide projects that are aimed at directly expanding and diversifying demand are targeted to priority opportunities, barriers and needs; the projects have generally not garnered strong industry involvement and buy-in (with some notable exceptions such as an industry collaboration project). Additional communication and implementation adjustments are needed to ensure stronger stakeholder buy-in and participation in industrywide projects.

The research, outreach and promotion, and education and training components of the above technical assistance programs have largely been planned and conducted independently of one another, and independently of broader OPA outreach projects, although with some coordination from time to time. There is a need for greater coordination and an over-riding synchronized strategy to ensure that these efforts are as effective and efficient as possible, and that

opportunities for involvement and assistance are communicated to external stakeholders consistently and effectively. In addition, there is a need to use these mechanisms to more effectively disseminate the work products of other sectorwide projects.

***Strategy: Focus business and technical assistance activities on priority market opportunities and barriers, while coordinating activities across programs to leverage synergies with outreach, education and research activities.***

Recommendations follow below.

**14. Continue to focus TDA and RAC technical assistance on top-priority opportunities and barriers.**

Both the TDA and RAC technical assistance programs have consistently prioritized activities to target top-priority expansion opportunities and barriers. Top-priority options for consideration going forward include:

- a. Continue to prioritize assistance related to paving applications new to California (such as terminal blend) and projects with unique barriers (such as small, remote communities);
- b. Continue to focus TDA technical assistance on the top-priority segments with the highest potential for wide acceptance and diversion (e.g., landfill gas, lightweight fill and retaining walls); and
- c. Focus a significant portion of TDA technical assistance resources on addressing supply-related barriers that are essential to unleashing the segment's full diversion potential. This may include support for business models such as processing capacity co-located at landfills or (if appropriate sites can be identified) near highway job sites, assisting potential suppliers to integrate TDA supply activities into their current operations, identifying TDA projects that have feasible supply channels that expand overall use, and/or documenting the business considerations related to specific opportunities.
- d. Address the need for widely accepted quality standards for tire-derived rubber feedstocks and/or for select TDPs by exploring opportunities with industry players for establishing new standards and/or promoting existing standards.

**15. Continue to offer TBAP direct business assistance services, while adjusting program rules that determine how to prioritize applicants.**

A number of options related to TBAP implementation are provided in Section 4. Top-priority options for targeting and enhancing the TBAP program include:

- a. Provide priority consideration to:
  - Manufacturers/producers of new and established molded and extruded products with significant market expansion and diversification potential;
  - Processors interested and well-positioned to expand marketing and sales to civil engineering projects and/or to test innovative approaches to supplying TDA to state and local civil engineering projects. As TDA demand increases, and especially if a larger number of smaller projects are established, opportunities for processors to test new supply systems and/or adjust current operations in ways that facilitate supplying such projects may open up;
  - Processors interested and well-positioned to expand marketing and sales targeted to manufacturers of established and new molded and extruded products;
  - RAC blenders and other firms positioned to expand and diversify sales of RAC; and



- All eligible firms that have not previously received TBAP grants.
- b. Also, CalRecycle should rank returning grantees based in part on criteria that consider the likely positive benefits of providing services to these grantees, based on their prior TBAP experience, identified needs and potential results related to increasing their long-term viability while expanding and diversifying markets.

#### **16. Increase stakeholder buy-in and participation in TBAP sectorwide projects.**

A number of implementation options related to TBAP sectorwide projects are provided in Section 4. Top-priority options for consideration mainly relate to increasing the buy-in and participation of stakeholders in TBAP sectorwide projects and coordinating with other CalRecycle activities, including:

- a. Explore the potential to leverage industry involvement in outreach activities through an appropriate, equitable channel, for example by inviting firms to distribute CalRecycle prepared marketing collateral and/or by involving them as appropriate in CalRecycle outreach and marketing activities. This can both further catalyze industry-led activity (which furthers CalRecycle goals) as well as provide a vehicle for expanding industry involvement in shaping and implementing sectorwide projects;
- b. Focus sectorwide projects on the provision of tangible assistance such as disseminating sales leads related to upcoming construction projects or government procurements; offering “meet and greet” opportunities with key customer groups and expanding and leveraging the draft catalog to provide sales tools that both equitably provide information on all California TDP producers and are practical to use, depending on the results of current pilot projects under way;
- c. Increase performance tracking, reporting on activities and results, and dissemination of work products such as tool kits and guidance documents; and
- d. Ensure that ample time is available to conceive and implement sectorwide projects, and limit the number of projects so that CalRecycle staff, stakeholders, and consultants are not overwhelmed by too many activities being conducted simultaneously.

#### **17. Coordinate technical assistance activities across programs and other market development mechanisms.\***

This is identified as a priority recommendation because of the potential synergies of greater coordination across technical assistance efforts. Currently technical assistance staff coordinate in an effort to inform one another of approaches under way and to compare notes on lessons learned. However, this coordination is not even across programs and is not always done in the planning and contractor procurement stages. Recommendation #3 above provides examples of how planning can generally be coordinated across programs. Following are some more specific examples relevant to business and technical assistance:

- a. Coordinate efforts across the TDA program and TBAP to address TDA supply-related barriers, for example, by conducting regular quarterly meetings for staff and consultants to update one another;
- b. Promote TBAP services to RAC suppliers in an effort to expand their sales to local agencies and private firms, or to processors to help market ground rubber to molded/extruded product producers and to help solve TDA supply issues, as described under recommendation #15a above;



- c. Generally, ensure that TBAP sectorwide activities are closely coordinated with TBAP direct business assistance activities, as well as CalRecycle grants and loan staff, and that these efforts mutually inform one another. The TBAP program can be used as a conduit to leverage marketing and sales efforts by California tire processors and TDP producers., such as by providing opportunities for firm representatives to meet with prospective customers during CalRecycle-sponsored events and activities.

## Education and Training

CalRecycle identifies tire events as education and training in the Five-Year Plans, but does not otherwise have a formal education and training program per se. While the Five-Year Plan identifies the annual tire conference as an “education” activity, a great deal of more technical, focused education is provided through the technical assistance programs described above. The annual tire conference or workshop does provide important education to a variety of stakeholders on relevant topics, but because of the diverse audience, it is not intended to provide the type of hands-on training needed for specific market players or objectives, such as use of TDA by engineers or operational adjustments by processors to reduce cost and improve quality. The TDA and RAC technical assistance programs have prepared guidance manuals and other technical training materials, and have offered workshops to local agency engineers and others aimed at education and training. The TBAP sectorwide projects have included training workshops and webinars involving quality control and process improvement, selling TDPs to government and green building sectors, using construction databases as a sales tool, and educational workshops on California waste tire and TDP market trends. Many of these workshops have been conducted in conjunction with CalRecycle’s annual tire conferences.

In the current Five-Year Plan, approximately \$84,000 per year is allocated for education and training on average through 2013/14, or less than 0.5 percent of the total market development budget as defined in this report. However, this budget line only includes funding for tire events such as the annual conference, and excludes portions of the business and technical assistance activities aimed at providing education and training services.

***Strategy: Align education and training with outreach and technical assistance activities to build synergies, and coordinate activities across all programs.***

Recommendations follow below.

### **18. Expand education and training activities and continue to focus them on top-priority market expansion opportunities and barriers.**

As described above, the RAC, TDA and TBAP technical assistance programs undertake a range of education and training activities that are generally well targeted to priority market segments and barriers. Top-priority options for consideration going forward include:

- a. Conducting additional education focused on landfill gas applications after current ongoing research is completed, and marketing materials are prepared in conjunction with the Green Roads Campaign;
- b. After research on terminal blend applications is complete, if indicated, prepare materials and offer workshops targeting local agencies and/or Caltrans regions;
- c. Seek opportunities to target new and established manufacturers with potential to expand and diversify use of ground rubber as a raw material through workshops and educational efforts focused on the manufacturing characteristics of ground rubber; and

- d. Periodically follow-up previous trainings on quality control, quality standards, and process improvement, while exploring with industry opportunities to establish more widely accepted quality standards. (See recommendation 14D above.).

**19. Maintain a consolidated education and training agenda that is coordinated and synchronized with technical assistance, outreach and promotion activities.**

Maintaining a regularly updated education and training agenda will assist stakeholders that may be targeted by multiple training opportunities, and would aid in helping CalRecycle staff and contractors understand the full range of ongoing activities. It also will aid in budgeting and in preparing a coordinated Research and Development Plan as part of the Five-Year Plan process as described above under Recommendation #3. A portion of the education and training agenda should target staff capacity development related to market information. This could be accomplished in conjunction with development of annual market updates, for example, by conducting periodic forums focusing on different market segments.

**20. Provide a central access point that consolidates education and training resources.\***

This is identified as a priority recommendation because of the potential value to many different types of stakeholders in consolidating educational resources for easy reference. CalRecycle has produced a large number of educational resources related to tire market development. While the online publication list is helpful, there is no central source that provides easy access to readily identifiable materials on different topics, including guidance manuals, reports and other publications, fact sheets, and conference presentation slides. One option for implementing this recommendation is to consolidate responsibility for it with the performance measurement function described under Recommendations #4 and 7.

**21. Expand partnerships to leverage and institutionalize education and training programs.**

There are a number of opportunities for effectively leveraging CalRecycle education and training efforts and institutionalize them beyond CalRecycle activities. Top-priority options for consideration include:

- a. Conducting workshops for RMDZ Zone Administrators to educate them about TDP market development and local procurement opportunities;
- b. Establishing training sessions on landfill gas TDA applications in conjunction with the Solid Waste Association of North America (SWANA); and
- c. Seeking opportunities with engineering organizations and public works organizations to provide training on civil engineering and paving applications.

**Outreach and Promotion**

CalRecycle outreach and promotion activities fall into two broad categories: broad outreach campaigns managed by the Office of Public Affairs (OPA), and more focused, technical outreach activities undertaken by program staff and/or contractors. In the current Five-Year Plan, an average of approximately \$2.4 million per year is allocated to outreach and promotion activities through 2013/14, or about 13 percent of the total market development budget as defined in this report. This estimate excludes OPA outreach that is not market-development oriented (e.g., tire maintenance outreach aimed at source reduction), and also does not include portions of the technical assistance program activities that are aimed at outreach and promotion.

OPA has managed four campaigns over the past five years. Two are not aimed at market development: one focused on source reduction (through improved tire maintenance) and the other focused on promoting retreading. The other two are Green Roads campaigns, one of which is ongoing. The OPA projects use systematic research to study target audiences and develop messages, and are not directly developed by technical staff. Past campaigns have suffered from a lack of technical input on the scope, direction, and implementation. In part, this may have been the result of active involvement by Board Members of the previous CIWMB who directed certain aspects of the campaigns while approving contract concepts. The current campaign is being implemented with technical staff involvement, and will assist in developing marketing collateral for technical outreach activities, but also involves major components geared toward raising awareness about rubberized asphalt concrete among the general public and local decision makers who may be too far removed from specific TDA and RAC decision-makers to directly impact sales. Outreach conducted through the technical assistance contracts, on the other hand, has targeted and reached engineers, public works directors and—in upcoming TBAP outreach activities—architects and specifiers involved with green building projects. However, these efforts could be better coordinated with the broader OPA outreach campaigns, and could benefit from synergies of aligning their approach, messages, and materials to achieve economies of scale. TBAP outreach also includes ongoing projects testing one-on-one outreach to state and private architects and to Caltrans, as well as production of an online catalog focused on California-produced TDPs appropriate for the green building market sector.

***Strategy: Create an integrated outreach and promotion plan that utilizes technical and outreach expertise, synchronizes activities across programs, and implements them in a well-coordinated and focused fashion that reinforces education, technical assistance and funding assistance programs.***

Recommendations follow below.

**22. Develop a coordinated outreach and promotion plan that integrates outreach activities and performance measurement across programs.**

CalRecycle staff is currently working to coordinate staff and contractors involved in outreach activities, and this is greatly aiding ongoing efforts. However, some of these outreach initiatives were not coordinated during the planning and/or contractor procurement stages. While coordinating approaches may require additional time and resources, the potential benefits include better outreach materials that reinforce common messages and information that targets audiences with a common purpose. Recommendation #3 identifies options for coordinated planning across programs. Top-priority implementation options for consideration include the following (note that CalRecycle already seeks to do many of the following—they are included here for completeness):

- a. Ensure that the scopes of work for outreach campaign contracts are crafted and implemented with input from both OPA and program technical staff involved in different areas such as TDA, TBAP, RAC, etc., and that the approach fits with the strategies, goals, and objectives in the current Five-Year Plan (for example, targeting audiences and issues identified as key barriers for top-priority market segments);
- b. Ensure that outreach activities benefit from the different skills and experience of both OPA staff and technical program staff and that outreach activities are timed and conducted in such a manner as to provide maximum support for ongoing technical assistance, education and/or funding assistance programs;

- c. Reinforce in outreach activities the full range of CalRecycle assistance opportunities including funding, technical assistance and education;
- d. Further leverage grants by regularly posting standardized educational signs and materials (that go well beyond identification of state sponsorship) at grant-funded locations as part of statewide outreach campaigns; and
- e. Include in outreach plans the need to package information and data on product cost and performance (for example, as recommended to be gathered under #7 above).

**23. Maximize efforts targeting high impact audiences and market segments.**

For the priority market expansion opportunities of TDA, RAC and molded/extruded products, the target audiences are likely to involve relatively small, unique groups with specific needs, including engineers, landfill operators, public works directors, manufacturing firm representatives, and select targeted consumers of molded/extruded products such as architects and contractors or industry specific product specifiers. Generally, CalRecycle should allocate a higher portion of its market development outreach budget to outreach, and a relatively high percentage of the outreach budget to these groups, while considering broader campaigns cautiously. While broader media campaigns may have benefits in terms of increasing overall awareness and demand for select TDPs, they are riskier in that they are more expensive and compete for target audience time and attention.

**24. Expand and strengthen CalRecycle communication vehicles targeting key stakeholders.\***

This is identified as a priority recommendation because of the need for and value of more consistent messaging and delivery of information to market players. CalRecycle relies on its website, group e-mails, and occasional stakeholder meetings to communicate with the tire recycling industry and other interested parties. Following are several top-priority options for enhancing these communications:

- a. Continue to expand and maintain the pilot electronic catalog of California TDP producers, and use it to complement or eventually replace the online SABRC database with a more user-friendly, informative source of information, including up-to-date web pages or other tire product/firm listing currently on the CalRecycle website;
- b. Issue a brief, low-cost periodic electronic newsletter (i.e., monthly) that lists upcoming events and opportunities, provides project updates, and seeks to provide information of value, such as leads (where available from public sources) related to upcoming construction projects or government procurements that may offer sales opportunities;
- c. Completely reorganize and update the CalRecycle tire market development web pages, including updating or establishing pages dedicated to: planning and outreach plans, education and training agendas and resources, funding and technical assistance opportunities, TDP performance and cost information, and general resources. Outdated information should be removed;
- d. Continue to conduct periodic interested parties meetings to keep stakeholders up to date and receive input.

**25. Increase partnerships within California and externally to promote TDP sales.**

Top-priority options for consideration include:

- a. Partnering with California processors and TDP producers through appropriate channels that are both effective and equitable to all parties. In this regard, CalRecycle should

monitor the development of the California Rubber Recycling Network, which may provide a new conduit to partnerships in outreach activities aimed at increasing TDP sales through conduct broad outreach and marketing activities such as trade show exhibits and presentations, website-related activities, and broad marketing;

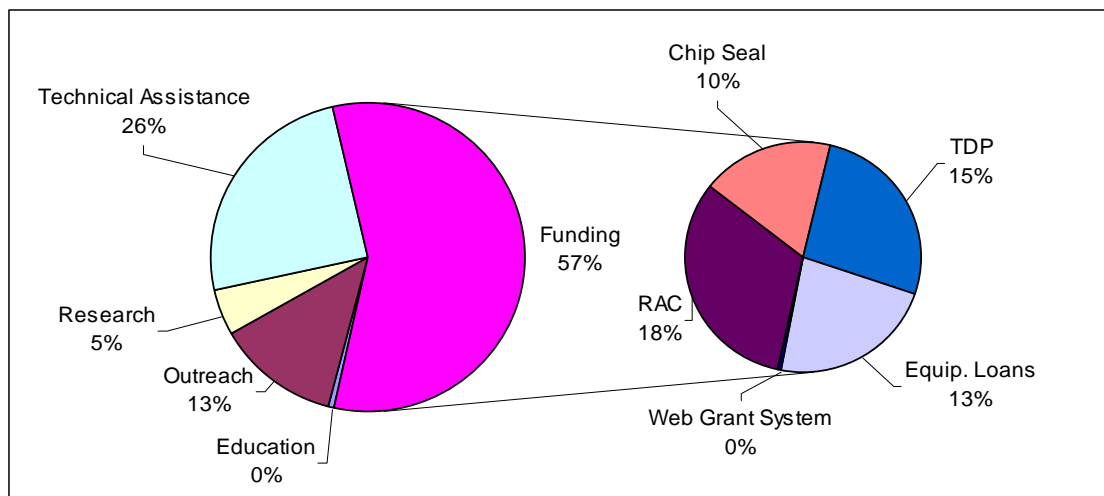
- b. Partnering with national trade associations, other states and/or the U.S. EPA to promote TDPs nationally and to fully leverage national associations and venues; and
- c. Partnering with groups with similar interests such as the Recycling Market Development Zone Administrators, local recycling coordinators, state recycling organizations, the U.S. Green Building Council, or the new federal Green Highways Partnership.

## Recommended Budgetary Considerations

This section presents recommendations related to allocating budgeted funds to CalRecycle's portfolio of tire market development programs. As with the program recommendations above, these are offered for CalRecycle staff consideration as they begin to draft the next Five-Year Plan for stakeholder review in late 2010 and early 2011.

Figure 7-3 presents a breakdown of average annual allocations to each market development mechanism, based on analysis of budget figures for FY-2009/10 to 2013/14 as presented in the most recent Five-Year Plan. Also shown is additional detail on the funding assistance category. Appendix E presents a detailed breakdown of the budget figures summarized in Figure 7-3.

**Figure 7-3. Current Market Development Budget Allocations – Based on Contracts and Expenditures in Five Year Plan, FY 2009/10-2013/14 (Total Budget = \$18.5 million)**

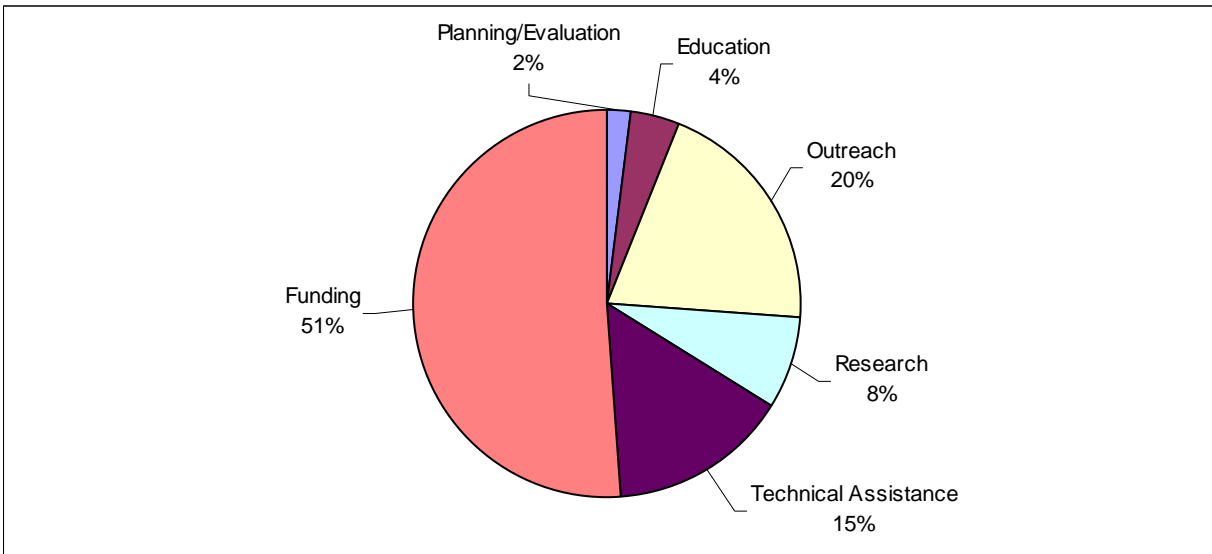


### Notes:

1. Based on Adjusted Five-Year Plan budgets.
2. Excludes certain activities listed in the Five-Year Plan under market development that do not support demand increasing or diversification objectives (e.g., tire maintenance outreach aimed at source reduction).
3. Technical assistance programs include an unidentified allocation for outreach and education activities.
4. Web Grant System funding has ceased.
5. Total Market Development Five-Year Budget = \$92,593,864 as defined in this report.
6. Average Annual Market Development Budget = \$18,518,773 as defined in this report.

Figure 7-4 shows one possible scenario for a revised budget allocation reflecting a shift in program emphasis in accordance with the recommended priorities outlined herein, and assuming that the total budget remains the same. We assume that the total market development budget available remains at the average annual level in the current Five Year Plan, or about \$18.5 million per year.

**Figure 7-4. Recommended Market Development Budget Allocations – Based on Mechanism Budgets to be Allocated Across Contracts and Programs (Total Budget = \$18.5 million)**



**Notes:**

1. Excludes non market-development programs.
2. Indicates actual allocation for each mechanism – specific contracts would need to allocate a share of relevant mechanism budgets.

In both budget figures, budget categories are defined by market development mechanisms instead of by program, in keeping with the over-riding recommendation to shift to a strategic planning process rather than a program-based process.

However, it is important to note a key difference between how the two budget figures above are organized. In Figure 7-3, current budgets for each market development mechanism are based on current programs. For example, “Technical Assistance” includes the complete TBAP, TDA technical assistance, and RAC technical assistance contracts, even though they each include outreach, education, and research elements. (There was no accurate basis available to break out these components in a consistent manner.) On the other hand, in Figure 7-4, future budget allocations are based on the recommended level of effort to be targeted to each market development mechanism, without any specific assumptions about the particular contracting vehicle to be used. For example, the technical assistance, outreach, education, and research elements that are currently bundled in the TBAP, RAC technical assistance, and TDA technical assistance contracts are in Figure 7-4 disaggregated and shown separately. As with other implementation issues, we assume that CalRecycle will determine the most appropriate and



effective means of assigning responsibilities and implementing the activities as part of its Five-Year Planning process and through established management protocols.

Key considerations in developing the reallocated budget scenario presented in Figure 7-4 are:

- a. New budget categories for education (4 percent) and planning/evaluation (2 percent) were established to specifically allocate resources to these activities and acknowledge their role. Education is assumed to include training workshops, webinars, and similar activities in addition to the annual tire conference. While planning/evaluation may be conducted mainly by CalRecycle staff, identifying a small share of budget may still be desirable to demonstrate that these important activities do come with a cost. In practice, these budget shares may be allocated across difference contracts.
- b. The research budget is nearly doubled (to 8 percent of the total budget) to reflect increased emphasis in this category, recognizing that much of this budget may be implemented through contracts currently classified as technical assistance (i.e., TBAP, TDA and RAC technical assistance contracts, or others).
- c. The budget for funding assistance was reduced by 4 percent; however, with an assumption that reductions in funding would relate to low-priority products and/or reductions in funding to grantees who have already demonstrated certain products, as discussed under Recommendation #9. With respect to the breakdown in the funding assistance category, in this preliminary breakdown we propose providing for a new TDA funding program and a new innovations grant program. However, we assume that funds for this program will be reallocated from RAC grants targeting ongoing users and from chip seal grants.
- d. On the surface, it appears the budget for technical assistance was reduced by 10 percent; however, a significant portion of the increased funding allocated to outreach and education was formerly allocated to technical assistance and we recommend that current levels of technical assistance continue, with expanded outreach to complement efforts.
- e. The budget for outreach and promotion was increased by 7 percent of the total market development budget; however, much of this is currently being performed under technical assistance contracts. However, this increase is in line with the recommendation to expand focused outreach targeting key customer groups and to leverage funded projects by increasing signage and related publicity opportunities. The proposed budget allocations above should be regarded as conceptual in nature with actual allocation amounts and specific contracting mechanisms to be determined through the Five-Year Plan development process.

## ***Overall Conclusions—Three Scenarios for Moving Forward***

### **Overview**

This subsection brings in the findings from Section 6 to summarize at a very high level the recommendations of this project in terms of CalRecycle's options moving forward. In short, there are three scenarios as summarized in Table 7-3 and described below.

As with the previous recommendations, we assume that CalRecycle staff and management will determine the course forward, including garnering stakeholder feedback.



**Table 7-3. Three Alternative Planning Scenarios for Moving Forward**

Scenario	Cost Impacts	Estimated Maximum 2015 Diversion Attainable	Notes/Issues
1. Optimize Programs Under Current Legislation and Funding Levels	No change - CalRecycle allocations of approximately \$18.5 million per year to market development under current funding.	81% Diversion Rate 428,000 tons 42.8 million PTE	Uncertainty over projected diversion but not likely to reach 90% goal. Potential for major reduction in diversion due to federal TDF regulations and other threats.
2. Complement Current Programs With New Legislation	Cost impacts to CalRecycle for overseeing new use mandates. Possible increased costs to state/local agencies due to purchase preference and/or use mandate.	85% - 90% Diversion Rate 449,000 - 474,000 tons; 44.9 – 47.4 million PTE (Estimated 5% increase over Scenario 1, with higher potential levels through use mandates).	Legislation required – will garner significant opposition. Feasibility of use preferences/mandates is questionable at present due to budget and other concerns.
3. Extended Producer Responsibility	Reduction of state programs and costs Increase in private sector programs. Possible reduction in net cost to generators, dealers, etc.	81% Diversion Rate assumed – but could vary significantly (could be required to achieve 100% diversion).	Would privatize market development programs. Specific CalRecycle continuing role to be determined through legislative process. Significant time and legislation required to implement.

### **Scenario 1—Optimize Programs Assuming Current Legislative Authority and Funding**

This scenario reflects the detailed recommendations provided earlier in this section, as supported by the analysis in previous sections, and is based on the assumption that current funding levels remain steady and no new legislation is implemented. As indicated in Table 7-3, under this scenario there are no new costs imposed. There is a shifting of resources and funding that would impact some market players, but no costs are imposed on them. The maximum projected diversion rate in 2015 is estimated at 81 percent, with an increase from 32.6 million PTE in 2008 to 42.8 million PTE in 2015. While there is much uncertainty over future market trends, this is considered a best-case scenario, based on current trends, continued and strengthened CalRecycle programs and an assumption that no major threats impact the market. Taking steps to optimize the current programs is important both as a means of increasing diversion, but also to guard against potential reductions in waste tire demand due to threats as described in Section 3 of this report.

## **Scenario 2—Complement Current Programs with New Funding, Mandates or Other Policies That Would Require Legislation**

Scenario 2 is based on the adoption of new policies rated as medium or high priority in Section 6. The funding assistance policies evaluated in Section 6 (e.g., grants and loans) have already been incorporated into the recommendations under Scenario 1, as it was determined that they can all be implemented under current legislative authority. In contrast, Scenario 2 would involve CalRecycle seeking legislation to pursue the policy changes described below.

Two options are recommended, as they are consistent with the criteria used to evaluate options, including diversion potential, cost considerations and implementation issues (including CalRecycle's goals and guiding principles). These recommended options include:

- Secure legislative authority to promote TDF (Policy Option #5.2). This would allow CalRecycle to weigh in on proposed federal regulatory changes that could reduce TDF demand and otherwise promote this well-established end use market. Current TDF demand is 7.7 million PTE, with a maximum market size of 15 to 20 million PTE. One cement plant in particular has signaled its interest in significantly expanding TDF use when economic conditions improve, and another plant which is currently closed due to low cement demand hopes to start up again when conditions improve. These factors could mean that TDF is nearing a “moment of truth” where demand may increase or decrease significantly. It is important that CalRecycle be in a position to influence this direction.
- Seek state regulatory changes to allow use of TDA in septic systems (Policy Option #5.5). This would provide the essential pre-requisite for developing this use with a maximum market size in California of 4 million to 8 million PTE, which is not currently used in California but which is well proven elsewhere. If successful, demand would likely increase slowly over a period of several years.

The following additional policies are recommended for further exploration by CalRecycle, specifically by requesting feedback from stakeholders and considering whether concerns that may jeopardize implementation feasibility can be addressed. These options are included here because together they have the potential to significantly increase diversion. However, they are not identified as “recommendation” mainly because they may not be politically feasible during the current state budget situation. These options include:

- Explore with stakeholders and further investigate the impacts of an expanded and strengthened purchase preference program (Option 3.1) and/or an expansion of the current Caltrans RAC use mandate to cover local agencies, and possibly other products and other state agencies. While the political feasibility of this action may be low, it holds the promise to greatly increase the current market penetration of RAC from about 12 to 17 percent currently to capture more of the estimated 25 to 35 million PTE in potential demand for RAC. While this option would likely increase short-term costs, proven RAC life-cycle benefits could actually reduce costs over the long term, again emphasizing the need to coordinate activities with research and outreach to frame the perception of such a policy shift. While the use mandate option has the potential to substantially further increase demand for RAC, it also would likely be opposed by those agencies subject to the mandate. The pros and cons of these options merit additional investigation prior to determining the course forward.

- Mandate that ground rubber purchased to satisfy state use mandates be produced from California-generated waste tires (Policy Option #3.3). This could increase diversion significantly to this high-value, established use. While estimates of out-of-state ground rubber supplied to Caltrans are not available, for the sake of illustration, if 15 percent was currently sourced from out-of-state and this was shifted to in-state producers, it would increase diversion through ground rubber production by 0.52 million PTE, or a little over one percentage point of total generation. A previous legal opinion has reportedly been prepared that found this option is not feasible due to the federal Interstate Commerce Clause. CalRecycle should confirm this and, if appropriate, pursue its adoption.
- Mandate a future, conditional ban on tire landfill disposal (Policy Option #5.1). This would send a strong signal to the market place that the state intends to eventually end landfill disposal of waste tires, thereby helping to catalyze shifts in industry practices. The ban would be phased in over several years, and made conditional on a determination that demand for waste tires has exceeded supply. One option would be to announce this future ban in conjunction with a new zero waste tire policy.

The proposed new policies will complement all existing programs and result in improved chances to further expand demand. We estimate the net effect could range from an additional five percent diversion increase over that projected by 2015 under current legislation and funding, to more than 90 percent (primarily due to the potentially high diversion impacts of a local RAC use mandate). Additional investigation based on specific proposals would be needed to more thoroughly document these estimates and other pros and cons of the use mandate and purchase preference options.

Implementing these policies would also require some additional activities and therefore costs for CalRecycle as noted in Section 6. Cost impacts to CalRecycle under Scenario 2 could include staff time required to seek policy changes, oversight and administration of programs, and tracking activities.

### **Scenario 3—Completely Change the Current Legislative Framework by Adopting Extended Producer Responsibility Legislation**

Scenario 3 is based on the adoption of a new extended producer responsibility mandate for waste tires, modeled after the program in place in Ontario, Canada, but with a strong market development requirement added. There are many different options for how such legislation could be structured, as discussed in Section 6, but the underlying commonality would be a requirement on tire manufacturers to establish and pay for a system to ensure that all waste tires generated in California are managed appropriately. The law could potentially require 100 percent diversion ultimately with interim goals. Other key considerations include:

- Would there be a role and funding provided for local governments in the system?
- Would CalRecycle have a role beyond monitoring and enforcing the mandate, in addition to its current permitting and enforcement role which we assume would remain in force?
- What reporting requirements would be placed on the new system?
- Would industry be constrained from using certain markets such as TDF?

Generally, EPR for tires is compelling, but it has not emerged as a high priority for product stewardship advocates, in part because of the higher priority placed on other products with

hazardous or toxic components and also because in most states there is an infrastructure in place for managing waste tires.

Implementing EPR for tires could substantially reduce the size and scope of, or even eliminate, CalRecycle's waste tire market development program. Presumably this would be implemented in conjunction with a reduction of the tire retail fee to the point needed to maintain state permitting and enforcement roles. While tire manufacturers would probably impose a new generator fee at the point of sale, based on existing EPR systems the current informal generator fees charged by tire haulers would be eliminated, with the industry consortium covering all costs throughout the system.

In terms of market development advantages, EPR can be viewed as preferable to the current system if one believes that the private sector is likely to be more effective and efficient than the government sector in conducting market development. Even if this is taken as a truism, it is still not entirely clear that the private sector would be better positioned to move diversion rates beyond their current level in California.

The other reasons often cited for EPR include providing an incentive for manufacturers to design for recycling, and eliminating the unfunded mandate of local government waste management systems.

R. W. Beck has not made a determination about whether EPR for tires should be pursued. Rather we recommend that CalRecycle place the concept before stakeholders for public input and discussion. It is a compelling concept with the potential to increase efficiency and radically alter current practices. As such, it deserves a careful and unrushed hearing. It should be noted that if a tires EPR policy is pursued, it would be impossible to determine in advance the final form that the legislation may take if adopted, due to the intense political positioning it would likely trigger.

## ***Recap and Next Steps***

This report provides a detailed review of CalRecycle's entire waste tire market development program. To ensure an objective, systematic approach, current and potential options were analyzed based on six generic market development mechanisms rather than focusing solely on ongoing programs as they are currently defined. The project applied a systematic framework in which we first established broad goals, desired outcomes and guiding principles defining the state's role in market development (Section 2), and then defined priority market expansion and diversification opportunities and associated barriers (Section 3). We then evaluated programs and generated options for adjustment based on an evaluation of how current activities are aiming at these targets, and how effective they have been in practice, including identification of key implementation issues and possible approaches to address them (Section 4). We supplemented this analysis with a review of CalRecycle's current planning and performance measurement practices (Section 5) and a detailed evaluation of identified policy options (Section 6). Finally, we developed the overall conclusions and recommendations based on systematic review and analysis. These recommendations are put forth to further the achievement of CalRecycle's goals and to keep in line with its guiding principles (summarized in Table 7.2) to expand California's waste tire market.

R. W. Beck's intent is to offer CalRecycle and stakeholders a detailed information reference and a framework for evaluating options, articulating a strategic plan and most importantly implementing activities in a well-coordinated fashion going forward. Hopefully, this work will prove a valuable tool both in the upcoming Five-Year Plan planning process in late 2010 and early 2011, as well as in future plans.

# Appendix A

## Glossary of Key Terms and Acronyms

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**Alternative Daily Cover (ADC)**—The U.S. Resource Conservation and Recovery Act Subtitle D underwent a major revision in 1991 to ensure human health and the environment were protected. A major change was the requirement to cover disposed solid waste with six inches of earthen material at the end of each operating day, or at more frequent intervals if necessary. Materials other than, or in combination with, earthen materials, referred to as Alternative Daily Cover, may be used to achieve the same function, including shredded tires. Permission must be granted by the Enforcement Agency for the landfill with concurrence by the CalRecycle.

**Asphalt-Rubber**—A blend of asphalt cement, ground tire rubber, and additives in which the rubber component is at least 15 percent by weight and has reacted in the hot asphalt cement sufficiently to cause swelling of the rubber particles.

**Buffings**—High-quality scrap tire rubber, often elongated, that is a byproduct from the conditioning of tire carcasses to remove worn/used tread from a tire in preparation for re-treading. Buffings contain essentially no metal or fiber.

**Chip Seal**—A pavement surface treatment formed by evenly distributing a thin base of hot asphalt or asphalt-rubber onto an existing pavement and then embedding finely graded aggregate into it.

**Civil Engineering (CE)**—Use applications for shredded tires in public works construction applications where defined properties are needed, including use in roadways and transportation systems, landfill systems, as lightweight fill in retaining wall applications, or levee projects.

**Cogeneration**—The process of combusting a fuel and using the heat for both an industrial process and for generating electricity. Waste tires and/or other fuels may be the fuel that is combusted.

**Crumb Rubber**—Rubber granules derived from a waste tire that are less than or equal to one-quarter inch or six millimeters in size. (30 Public Resources Code (PRC) §42801.7).

**Passenger Tire Equivalent (PTE)**—Historically, measurement of the quantities of waste tires were based on number of tires and not weight. Because waste tires come in a variety of sizes and weights (especially when passenger and light truck tires are compared to heavy commercial tires), it is useful to use a standard unit of measure to convert numbers of tires to weight and number of large tires to equivalent number of small tires, and vice versa. This factor is called the Passenger Tire Equivalent—the average scrap passenger tire historically has been commonly held to weigh 20.0 pounds. Furthermore, 14 CCR §17225.770 defines a "passenger tire equivalent" (PTE) as the total weight of altered waste tires, in pounds, divided by 20 pounds. 1 PTE = 1 Waste Tire.

**Rubberized Asphalt Concrete (RAC)**—A pavement material that consists of crumb rubber mixed into regular asphalt concrete (a mixture of asphalt binder and mineral aggregate). Since 2007 the California Department of Transportation (Caltrans) has superseded using the term Rubberized Asphalt Concrete with the term Rubber Hot Mix Asphalt, which is an equivalent term that Caltrans feels is more consistent with industry usage.

**Rubber Hot Mix Asphalt (RHMA)**—See the definition of Rubberized Asphalt Concrete.

**Scrap Tire**—A worn, damaged, or defective tire that is not a repairable tire. (30 PRC §42805.6).

**Tire Business Assistance Program (TBAP)**—A California program that provides services and resources for businesses who either process used tires or produce tire-derived products using California waste tires

**Tire-Derived Aggregate (TDA)**—Pieces of scrap tires that have a basic geometrical shape and are generally between 12 mm and 305 mm in size and are intended for use in civil engineering applications.

**Tire-Derived Fuel (TDF)**—The combustion of whole or shredded tires in an oxygenated environment to extract the energy value embodied in the tire for use in an industrial process or to generate electricity.

**Tire-Derived Product(s) (TDP)**—Material that meets both of the following requirements (30 PRC §42805.7):

1. Is derived from a process using whole tires as a feedstock. A process using whole tires includes, but is not limited to, shredding, crumbing, or chipping.
2. Has been sold and removed from the processing facility.

**Used Tire**—A tire that meets both of the following requirements:

- The tire is no longer mounted on a vehicle but is still suitable for use as a vehicle tire.
- The tire meets the applicable requirements of the Vehicle Code and of Title 13 of the California Code of Regulations.

**Waste Tire**—A tire that is no longer mounted on a vehicle and is no longer suitable for use as a vehicle tire due to wear, damage, or deviation from the manufacturer's original specifications. A waste tire includes a repairable tire, scrap tire, and altered waste tire, but does not include a tire-derived product, crumb rubber, or a used tire. (30 PRC §42807)

# Appendix B

## List of Supporting Documents

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### ***Project Background Reports and Documents***

***Working Paper #1 - Market Penetration Interim Report***—Report to CalRecycle that indicates, to date, the amount of tires diverted in California, the disposition of those tires, and the expected outlook for the various markets.

***Working Paper #2 - Review of Selected Other State/Province Scrap Tire Market Development Programs***—Interim deliverable for the Evaluation Project. Programs in other states/provinces were examined. Specifically, we examined tire market development programs in British Columbia, Illinois, Virginia, Utah, and Florida. These programs were selected with input from the advisory group and state staff.

***Working Paper #3 - Historical Review of CalRecycle Tire Market Programs***—Report developed as an interim deliverable for the evaluation project. Draft initially presented on Oct. 27, 2009. The draft has been revised in response to comments, and as additional information has become available.

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<http://www.calrecycle.ca.gov/publications/Tires/54098007.doc>

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<http://www.calrecycle.ca.gov/Publications/Tires/62204012.pdf>



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CalRecycle, Results from TDP Grant Recipient Survey Results, 2006, 2007, 2008, and 2009.

R. W. Beck and D.K. Enterprises for CIWMB, "California Scrap Tire Market Report, 2008," May 2009.  
<http://www.calrecycle.ca.gov/Publications/Tires/2009009.pdf>

Manex, 2010 CTBAP Grant Survey Results (Includes surveys of TBAP Round 1, 2, and 3 Recipients).

Wassmer, Robert, for CIWMB, "An Analysis of Subsidies and Other Options to Expand the Productive End Use of Scrap Tires in California," 2002.  
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# Appendix C

## Stakeholder Engagement Summary

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The Waste Tire Market Development Program Evaluation Project placed a strong emphasis on stakeholder engagement and feedback. Many opportunities were provided for waste tire businesses and other scrap tire-related professionals to provide input regarding current and potential tire market development programs. These stakeholder input opportunities, and a synopsis of the suggestions and comments provided, are summarized below.

Additionally, Appendix H below provides a summary of key issues raised at a public workshop held to discuss this final draft report, along with responses from R.W. Beck.

### ***Opportunities for Stakeholder Input***

#### **Project Advisory Group**

The Waste Tire Program Evaluation Project Advisory Group was established in summer 2009. The group was formed specifically to provide state staff and project consultants with input regarding the evaluation project process as well as their professional opinion regarding the content of the report. The advisory group is comprised of representatives with relevant expertise consisting of:

- Serji Amirkhanian, Ph.D., Director of Clemson University's Asphalt Rubber Technology Service (ARTS).
- Michael Blumenthal, Senior Technical Director, Rubber Manufacturers Association
- Christine Buchanan, City of San Diego
- David Goldstein, County of Ventura
- Terry Leveille, Editor/Publisher, California Tire Report and President, TL & Associates

The Project Advisory Group meet four times during the course of the project and discussed the following topics:

#### **Meeting of Aug. 5, 2009:**

- The purpose of the evaluation project was explained by state staff.
- The project evaluation framework was presented by R. W. Beck staff, and comments/feedback were solicited.

#### **Meeting of Oct. 28, 2009:**

- Historical Review of the Waste Tire Management Programs
- Market Penetration Status Report
- Review of Selected State and Provincial (e.g., non-California) Tire Marketing Programs

#### **Meeting of April 13, 2010:**

- Draft Report Sections Evaluating CalRecycle's Current Programs
- Preliminary List of Policy Options to be Evaluated

**Meeting of July 14, 2010:**

- Reviewed and discussed a complete draft report
- Discussion of market analysis statistics
- Detailed review of program and policy recommendations
- Discussion of budget allocation recommendations

**Tires Interested Parties (TIPS) Meetings**

Three Tires Interested Parties (TIPS) meetings provided opportunities for public input and discussion of the project and draft documents, as summarized below.

**Meeting of Aug. 25, 2010:**

- Project framework & methodology
- Draft guiding principles
- External programs review
- Market expansion barriers and opportunities
- Project status and next steps

**Meeting of Dec. 2, 2009:**

- Program Evaluation Project status
- Market Penetration Analysis preliminary findings

**Meeting of Aug. 25, 2010:**

- Presentation of complete, draft report
- Discussion focusing on market analysis, recommendations and overall priorities (see summary of issues at the end of this section).

**CalRecycleTires Workshop—Jan. 11, 2010**

In addition to the above opportunities for public input, the project was also discussed at a CalRecycle sponsored tires workshop, held on Jan. 11, 2010, at Sacramento State University. Attendees included tire-derived product businesses, CalRecycle staff, and consultants. The agenda included a session on Future Directions for California's Scrap Tire Markets (R. W. Beck) during which stakeholder input was solicited on market trends, CalRecycle's current programs, and ideas for future programs, goals and general directions.

Waste tire market program comments to be considered in the program evaluation were noted and are included below.

**CalRecycle Staff Interviews**

R. W. Beck conducted detailed interviews with specific CalRecycle staff regarding tire market development programs, in addition to gathering specific data and information on current and past programs. Interviewees included:

- Jennifer Caldwell (Senior Integrated Waste Management Specialist, Materials Management and Local Assistance Program, Local Assistance and Market Development)

- Mitch Delmage, (Supervising Integrated Waste Management Specialist II, Materials Management and Local Assistance, Local Assistance and Market Development, Bay Area)
- Linda Dickinson (Integrated Waste Management Specialist, Financial Division, Grant and Loans)
- Sally French (Senior Integrated Waste Management Specialist, Materials Management and Local Assistance Program, Statewide Technical and Analytical Resources)
- Bob Fuji (Senior Waste Management Engineer, Materials Management and Local Assistance Program, Technical and Analytical Resources Division, Research & Applied Technology, Science and Tire Engineering)
- Nate Gauff (Waste Management Engineer, Materials Management and Local Assistance, Technical and Analytical Resources Division, Research & Applied Technology, Science and Tire Engineering)
- Jim LaTanner, Equipment Loan Program (Staff Loan Officer [Supervisor], Financial Assistance Division, Grant and Loan Resources, RMDZ Loan Program)
- Michelle Martin (Staff Services Manager I, Materials Management and Local Assistance Program, Financial Assistance, Grant and Loan Resources, Grant Fiscal and Process Oversight)
- Stacey Patenaude (Senior Integrated Waste Management Specialist, Materials Management and Local Assistance Program, Technical and Analytical Resources)
- Brenda Smyth (Integrated Waste Program Manager, Materials Management and Local Assistance Program, Technical and Analytical Resources)
- Calvin Young (Supervising Integrated Waste Management Specialist I)

### **Grant Program Surveys**

Two surveys conducted during the project were referenced in this report.

#### **Survey of TBAP Grantees**

The Corporation for Manufacturing Excellence (Manex) conducted an online survey of California TBAP participants in January/February 2010 and again in March/April. The recipients were from all three rounds of the current TBAP. There were two complete surveys used in the analysis, however not all survey respondents answered all questions, nor did all respondents provide comments. Pertinent comments provided, however, are included in the summary below.

#### **Survey of TDP Grantees**

CalRecycle grant program staff conduct surveys of grant recipients annually. While the 2010 survey results are not yet available, comments from the most recent survey (2009) were reviewed, and comments were included in the summary below.

#### **Broad Solicitation for Written/Verbal Input**

Finally, CalRecycle staff solicited feedback from interested parties regarding the tire market development programs. This feedback was forwarded to R. W. Beck, and is included in the comments provided below.

## ***Summary of Suggestions and Feedback Regarding Waste Tire Market Development Programs***

Below is a summary of feedback and suggestions received from the various stakeholder input opportunities described above. In some cases CalRecycle staff has provided comments on the feedback listed. All comments were considered during the project and reviewed during drafting of the final report.

## General

- Need to better define success. Is it diverting more tires? Developing new, stronger markets?
  - CalRecycle Comment—success should be measured by the number of tires diverted from landfill.
- California’s market development programs have over-fed the supply side (assisting processors), thereby creating unhealthy competition and making the industry less efficient.
- Must address the high cost of doing business in California, which leaves businesses in other locations (such as Canada and Utah) at an advantage, due to their subsidies.
- Educate more about the benefits of products manufactured with waste tires. For example, cured waste tire rubber helps get air out of raw material traps and life-cycle cost benefits.
- Many governments do not care about life-cycle costs—they are short-sighted, and politically driven.
- Need to address the lack of standards and specifications to ensure quality.
- Market development efforts should expand uses, not just focus on existing uses.
- Consider not just PTEs diverted, but also whether those tires would have otherwise been diverted. This will increase focus on rural areas and options, such as stamping, available in areas distant from crumb rubber, TDF, ADC, and engineering uses.
- Our tire fund should be used primarily to entice inventors via research and development as well as product testing to create new products using waste tire rubber (e.g., feedstock conversion).
- New tire manufacturing technologies are a potential threat to market development/future uses of waste tires.
- More cooperation and relationship-building between companies is critical.
- An industry group is needed, with an executive director. The group should focus on standards and specifications.
- Creating an additional industry group might fragment the industry. Networking is needed, but should be done using existing industry groups.
- California should use return on its investment as a guide for determining future approaches.
- We feel the program is running very well and we look forward to doing more. We have new potential with some large corporations which will divert over 500,000 lbs. of rubber.
- Emerging technologies should be tracked. Pyrolysis may be developing on a workable basis in the U.S. There is a proposed facility in Oregon that may come to fruition.
- There is a lack of processing infrastructure in the Sacramento region to produce more refined products and supply diverse markets including RAC, TDA, etc. CalRecycle should invest in the capital for this infrastructure in this region.
- Upcycling is a good thing. Not all recycling is created equal.
  - CalRecycle Comment—Primary driver is diversion, but secondary driver is to get diverse but higher-end markets to expand. CalRecycle is already supporting “upcycling” through grants and other programs that fund TDA and ground rubber applications.
- The driver on setting priorities and resource allocation should be based on market conditions and trends.

- Part of expanding markets means focusing on the private sector—targeting and marketing to the commercial marketplace, such as the landscape industry and the housing market. Get into the big box stores. There has been too much reliance on the public sector.
- In the past some efforts to break into the commercial marketplace were not successful due to lack of standards and product testing. Those services still need to be provided to ensure that quality products are offered, and that tire-derived products are not disparaged in the marketplace.
- If we look at which markets non-California derived rubber is going to, we will know which market segments should be able to survive without grants/subsidization.
- Processors and product manufacturers need to have a realistic understanding of what their marketplace is.
- The Tire Program should not be funding CalMAX and WRAP. These are ineffective programs from the point of view of assisting tire markets.
- CalRecycle should not micromanage the scrap tire industry. Instead, the focus should be on increasing the amount of tire-derived material going to end use markets.
- Once the assessment is made that will determine the real potential market demand, all efforts should be spent to address those markets (education, effective grants).
- It is important that education and research programs be subject to quantitative evaluation. This should be the case, especially, with seminars, workshops, technical assistance, and, most of all, public outreach. Use the metrics such as those local RMDZ Administrators must employ when recommending priorities for RMDZ programs. Identify CalMAX listings and identify the number of tires diverted through CalMAX. Similarly, interview tire-related WRAP award recipients to see how the process changed their business practices.
- Regulations should not just be for health and safety—they should also be used to achieve public policy objectives.
- Glad to see that the evaluation report considered many options that are not normally “on the table” for consideration, such as EPR and other ideas that may not always be popular.
- Mandates open up a whole can of worms. Aggregate, concrete, etc. industries will vehemently fight such mandates. State agencies, too, would fight mandates imposed on them. Mandates would cause more problems than they would resolve.
- Product price preferences would be preferable to mandates.
- Mandates for local governments regarding RAC usage are compelling because if life-cycle costs are considered, RAC comes out ahead—also, there is a relatively large potential market.
- There is a need for more education and outreach regarding legislative issues that impact the beneficial use of waste tires.
- Extended producer responsibility (EPR) would not be the industry’s first choice, but they would be willing to take it on if asked.
- Agree with the notion of taking into consideration objectives and performance measurement when deciding how to allocate funds.
- There should be more enforcement efforts, and/or documentation of those efforts, to ensure that processors and manufacturers receiving grants are not using scrap tires from Canada and other states.

- There is a need to better utilize and advertise research efforts and outcomes. For example, the life-cycle cost analysis study being done at UC Chico—this is not the first time they have looked at this—but we do not see much out there about it. There is a wealth of information from grant programs that is not fully utilized. It should be put together in a coordinated way, and made available to potential buyers of tire-derived products.
- CalRecycle should also invest in sharing results of other organizations' studies, as applicable and appropriate.
- In the past CalRecycle has avoided prioritizing markets, and we think that should continue. The concept of prioritizing markets creates as subjective false support for some markets at the risk and potential expense of other quality markets.
- Despite priority markets being identified, some tires will always flow to the lowest cost option. As long as landfilling is the cheapest option, some tires will flow there.

## Grants

- Demand-side programs like TDP playground grants are good, but must last through the recession.
- Need to audit more closely the source of rubber used in grant-funded projects.
- Equipment grants should be reinstated. This is the most direct way to support the industry. Also, allegations that led to the cessation of this grant program were not investigated, so this program should be reconsidered.
- Equipment grants were too much of a giveaway—all of the risk was on the state. Assistance to businesses can provide some financial assistance, but more responsibility/risk should be on the business than it was with equipment grants.
- It might be possible to match businesses with venture capital sources, so that the state does not take on undue risk. Loans are also preferable to commercialization grants. Funding feedstock conversion is less risky than funding product commercialization.
- Revisit the maximum dollar amounts for TBAP service grants. Why do some firms receive \$175K and others \$50K? There should be a clearer and fairer system for setting caps.
- Need a new RAC-style grant for both public and private green building projects.
- Give rubber molders funding to test waste tire formulation changes in product manufacturing. Publicize the program to make them aware of available funding. Make these grants one-time events, unless the producer of the products expands other product lines or expands their production at a later point.
- Give labs R&D funding to alter formulation from raw to waste tire content feedstock/products.
- Provide a rebate on rubber mulch or other TDPs at the retail/commercial level.
- Provide larger fund allocations for diversified growing installation businesses for product testing, marketing and business assistance.
- Provide access to funds for non-approved contractors. Less overhead.
- I think there are discrepancies between what my company received in funding (\$175,000), versus smaller experimental usage type companies getting \$50,000 for unproven technologies.
- Stop throwing money away, focus more on getting recyclables out of the waste stream and out of landfills.



- There should be more accountability for grantee administration (e.g., from R. W. Beck or Manex).
- We question accountability, skills, and use of time charged against our award by our grant administrator.
- Ongoing users of RAC don't need financial support, but first-time users or smaller users still receive/need some support.
- Inefficient companies should not be kept alive with grants.
- Grants should go to first-time users and users/processors located in rural areas.
- One-time-only grants can help businesses start up, vs. ongoing subsidization. Grants can have a great one-time impact.
- If companies close up shop, the price of California crumb rubber might go up. The state needs a diversion infrastructure that remains intact.
- There is a great need for information on the impact of past grants on the marketplace. This is critical for the success of any future grant program and expansion of the markets. Past grants have skewed the flow of ground rubber.
- Markets that rely on grants will not last.
- It is important to slowly wean businesses and buyers off of grants, but in a careful way, so that they do not fail. There is a balance needed: less reliance on grants should be complemented with an increase in funding of technical support, advertising, promotion—assistance that will lead to more market-driven activity.
- California needs to better understand what the marketplace would look like in the absence of grant programs, e.g., which markets could exist without grants?
- Grants are an important means of getting communities to “get used to” using alternative products and overcome barriers, although in the long-term, they should be “weaned” off of them.
- Grant recipients should be able to provide CalRecycle with good data.
- I like the idea of an innovative grant program.
- The innovative grant program could attract businesses or individuals with no business sense. Perhaps it could be incorporated under the umbrella of the TBAP program—have a special grant for innovative projects but limit them to existing businesses, or those in the tire industry with a proven track record. If you are going to have an innovative grant program, it should be very well defined and CalRecycle should carefully consider how the marketplace will be enhanced—and whether the rubber being utilized is that which is currently disposed.
- If an innovations grant program were established, CalRecycle should be sure that what could be eligible is well defined—for example, whether it could cover marketing, equipment, etc. Also, it should be very clear what types of entities would be eligible—businesses only, or would organizations (such as nonprofits with a research project, for example) also be eligible.
- Consideration of innovative grants should be done after other TBAP grants have been received, so that the marketplace needs can be better assessed. To some extent grants should only be provided to businesses that provide high-quality applications.
- It would help the industry if organizations (e.g., RPA, ISRI, ASGI) could weigh in on research projects that could benefit the entire industry.

## Civil Engineering

- Need to emphasize TDA more than currently.
  - CalRecycle Comment—We are currently working on accomplishing this through our outreach activities with our Green Roads, technical expert, and tire business assistance contractors.
- TDA as ADC is just another form of landfilling. Limit uses to those where the material is needed.
  - CalRecycle Comment—Agree that ADC is not a good use for TDA, however, under the current CalRecycle policy there is no basis to limit the use of TDA as ADC.
- The state should not pay for TDA projects (just provide technical support). Demonstration projects should not be required—several have been done and can be used as a reference.
  - CalRecycle Comment—TDA is a proven technology there is a need to both educate potential users as well as show them the benefits of TDA, so the demonstration projects will continue.
- TDA grants are essential or not many projects will happen.
  - CalRecycle Comment—A TDA grant program is currently being considered.
- Need to overcome storage issues. Processors that have contracts for delivery of TDA should be able to store the finished product (TDA) on site and not have it count against their storage limits. All on-site stored TDA would still comply with fire prevention/minimization standards. TDA can be stored at/near construction site, delivered at a prescribed schedule, and stored in a manner than is consistent with fire prevention protocols.
  - CalRecycle Comment—STAR staff is working with WCMP staff to overcome these challenges. In addition, there should be clarification on, and guidance provided on, how the hauler regulations apply to the transport of TDA.
- Need to overcome transportation/logistical issues by making schedules known further in advance and finding ways to efficiently deliver TDA from distant suppliers.
  - CalRecycle Comment—Due to the limited number of TDA suppliers, coordination of the transportation and logistical issues is the only way TDA can be delivered to TDA projects, especially those located in remote areas. Solutions to address these issues are linked to several factors. The first is resolving the storage issue as mentioned in the previous bullet. The second would be to identify new TDA processing facilities or diversifying existing tire processing facilities.
- The state can assist with better planning/coordination between project engineers, the construction company, and the TDA supplier. The concept is to have as long a lead time as possible. This will take training that can be provided by CalRecycle staff/contractors.
  - CalRecycle Comment—STAR, through its TDA expert contractor, has conducted numerous training sessions for local government stakeholders. We are currently improving our outreach and training activities with our Green Roads, technical expert, and tire business assistance contractors.
- In Northern California, rural/northern counties could encourage drop-off of scrap tires at their landfills. A mobile shredder can process the tires on a regular schedule to process the tires. When the landfill has a sufficient quantity of TDA it can be used for landfill construction projects. The state could provide an ongoing educational program (on a regional basis) regarding the use of TDA in landfill construction.
  - CalRecycle Comment—The equipment needed to produce TDA may not be mobile. In addition, about half of the counties in Northern California do not have landfills.

- Need to provide more education/technical assistance/oversight to potential end users about TDA benefits and how to use in various civil engineering applications. Develop and publicize more demonstration projects, building on work of Board staff and contractors. The San Diego area and the Bay area would be good target markets for TDA.
  - CalRecycle Comment – The areas should not be limited to just San Diego and the Bay Area.
- Bring the TDA education program to the counties (for example, at the annual and regional county conferences.)
  - CalRecycle Comment—We will work with our TDA technical expert contractor to identify the dates and then target these conferences for our TDA education and outreach efforts.
- Coordination between Caltrans and the Department of Conservation would be helpful, as well as the Association of County Civil Engineers and Board staff, as appropriate.
  - CalRecycle Comment—Unclear about the need for coordination between Caltrans and DOC. However, we have already done a significant amount of coordination with Caltrans, but since we have not done much with the Association of County Civil Engineers, we will work with our TDA technical expert contractor to conduct education and outreach with them as well.
- Still need to address Caltrans institutional barriers (however, they do see TDA usage in retaining walls as a good fit for them, and retaining walls use a lot of tires). Include Caltrans as a stakeholder—important to get their cooperation.
  - CalRecycle Comment—There are some Caltrans barriers for using TDA. Although we partnered with Caltrans to conduct several successful demonstration projects, they have not incorporated TDA use into the construction of their highways projects. One way to approach this is to integrate TDA into the design specifications for their projects. We have been working with Caltrans to revise their retaining wall design specifications to include TDA backfill option. We anticipate doing similar coordination with Caltrans on the design of their other highway projects as well.
- Need to streamline permitting for expanding use of TDA as ADC at landfills.
  - CalRecycle Comment—This issue should be directed to CalRecycle permitting staff.
- Need to improve reporting and tracking of landfill TDA and ADC use.
  - CalRecycle Comment—This information may be collected by the CalRecycle permitting and compliance staff, since use of tires in these applications typically requires their approval.
- Some processors are reluctant to move into TDA because of concerns about losing current markets and the long term demand and price for TDA. Need to encourage processors to diversify product lines so they can better coordinate production with projects in the area.
  - CalRecycle Comment—This would be a good task for R.W. Beck working in conjunction with Kennec.
- Promote TDA for use in septic systems—local water boards will adopt state standards. However, most potential for TDA use in septic systems is in the foothills, which happens to be a region where aggregate is abundant/low-cost.
  - CalRecycle Comment—In the near future the SWRCB is in the process of revising the septic tank regulations and staff has contacted them to discuss this issue.
- The demand-side programs are good (TDP playground grants, etc.) but will these last through the recession?

- There are concerns about toxicity/health impacts of the products, particularly in loose-fill and playground applications.
- Some problems/concerns with product performance need to be overcome. Examples include cracks found in some pour-in-place products, colorfastness, some steel in chips (playground surfacing), poor installation leading to maintenance issues, and concern over when panels will begin to lift.
- The TDP holds up much better as an attenuating surface than the prior surface. (Comment repeated, for both playground surfacing and horse-arena surfacing).
- It was difficult to identify TDPs. A list would be helpful.
- Grant final report requirements are overkill.
- Product has resulted in reduced maintenance.
- Online survey and reminder are helpful, and staff is great to work with.
- Tight budgets will prohibit additional use of the material in the future.
- Aside from ADC, I am unaware of any large-scale projects in California that have occurred without state funding. Until the logistical bottlenecks of large-scale projects (amount of shreds required/storage issues) are overcome, it is doubtful that there will be much non-state-funded activity.
- Given that there have been CERCLA suits against tire chips used as ADC, I would strongly suggest the state move away from that use.
- TDA strategy should be “traditional market development efforts” such as outreach, education, and technical assistance. Promote the cost savings and engineering and technical benefits of TDA. There should not be a lot of funded projects—maybe demonstration projects, with well-documented (and promoted) benefits.
- California has done so much in the realm of TDA being used in landfill construction—we need to capitalize on that work.
- TDA is a less sophisticated use of tires than what has evolved already in California—encouraging TDA is taking a step backwards. Most existing suppliers would rather utilize the equipment they have invested in to make ground rubber. If CalRecycle invests in developing TDA markets, they will only be marginally successful because most processors will continue to focus on crumb since it is a higher value market.
- There are hurdles to overcome with TDA that don’t exist with RAC. Some people simply do not like the idea of putting TDA in the ground. However, TDA has cost benefits that RAC does not have, as well as engineering benefits.
- Perhaps TDA as septic should be rated higher. The draft report indicates that there are regulatory issues, therefore it is a lower priority. This should make it a higher priority, so that the state can start working on it.
- Another issue with TDA is that there are two or three large-scale projects that appear to be forthcoming.
- CalRecycle need to be sure that growing TDA markets is pulling tires from landfill, not pulling tires from supplying higher-end markets.
- We do not see much benefit in the TDA policy recommendation (that CalRecycle seek regulatory changes to allow TDA use in residential septic drainfield systems), particularly given the level of effort that would be required to achieve this.

## **TDF**

- There is still a need to increase the TDF market; it is the top use nationally.
- The Board is statutorily limited, therefore the private sector needs to take a more active role in developing this market.
- Without the TDF market, the number of tires being landfilled could double.
- It looks as though the federal government will implement policy changes that will make TDF problematic, and kilns and cogeneration plants will shy away from using TDF. This will create a significant market void.
- We do not think the TDF policy recommendation (that CalRecycle seek legislative authority to promote TDF markets) would not result in much benefit, particularly given the level of effort required.

## **Ground Rubber Products (non-RAC)**

- Don't focus here; it is not likely to be a major source of growth.
- These products, like RAC, use a lot of rubber and the market wants to move towards value-added ground rubber products and this should be a major focus.
- Although lack of supply has been a barrier, more companies are gearing up to produce crumb rubber, so this may no longer be an issue in the future.
- Quality is a big issue—need to ensure more consistent standards for ground rubber for use in molded products.
- Promote a new, emerging market: cement with ground rubber, Caltrans is now purchasing.
- Provide information on TDP human health & safety and cost advantages. Ex: Compare alternative playground materials (rubber, stone, wood fiber, etc) based on impact attenuation, fall heights, and customer testimonials. Compare infill options based on water, fertilizer and pesticide use, disease transmission, impact on injuries, and life-cycle costs.
- Expedite the study on human health and environmental impacts of ground rubber (this may be unlikely, but is important).
- Turf is selling well but a major issue will be budgets, more than health issues. The industry is sold out for 1.5 years.
- Create an advertising campaign to broadly promote purchase of California TDPs (adapt “it’s good for the bottle it’s good for the can” to “it’s good for consumer, it’s good for the economy”).
- It would be beneficial for us to become involved in the “FloorScore” program, and we could use some assistance in this area. (Note: FloorScore, developed by Scientific Certification Systems [SCS] in collaboration with the Resilient Floor Covering Institute [RFCI], is a voluntary, independent certification program that tests vinyl, linoleum, laminate, wood, ceramic, and rubber flooring, and certifies that they meet the requirements of California Section 01350.)
- Feedstock conversion grants are beneficial because they increase the demand for ground rubber. Funds should be directed where they will create demand. There needs to be more focus on feedstock conversion.
- Markets are needed for the 20-40 mesh rubber that all ground rubber processors are stuck with.
- The artificial turf market (ground rubber infill) could be used as a paradigm for other ground rubber markets, because it is a growing market, yet has not received any state funding.

- R. W. Beck Comment—There have, in fact, been several TDP grants awarded for crumb rubber infill for artificial turf fields. Typically at least two are funded per grant cycle.
- One of the assessments that should be made is to analyze the production capacity of all California ground rubber producers as well as the type of size material they can make. The second part of the analysis should be to figure out which markets their material could go into.
- Ground rubber should be a higher priority— there is significant growth potential in that marketplace, and there is diversity within that market group. It is categorized as a “maturing market”—is that what makes it lower priority?
- The potential and current market figures for rubber mulch appear to be low.

## **RAC**

- Survey current RAC grantees to determine whether RAC is purchased only due to the grant and whether the county has purchased RAC without any grant money.
  - CalRecycle Comment—We are currently doing this.
- Conduct a market survey to determine the potential market for RAC.
  - CalRecycle Comment—Task for TBAP working with STAR staff and RAC expert contractor.
- End direct grants for purchase of RAC if the county is using RAC in other applications or if they have received a grant for RAC but not purchased any RAC for any other projects.
- Provide grants for first-time users of RAC only. Ongoing users should not be given grants. Grants could also be provided when there is a cooperative need to be set up.
  - CalRecycle Comment—We have implemented a tiered approach where first-time users are given priority and highest rebate amounts and limited to the first two years than grants to material procurement program participants.
- Identify non-RAC users (counties) and find out why they are non users, and then address reasons (lack of experience, not sufficient miles to pave).
  - CalRecycle Comment—This work is already being done by RAC expert contractor (Jacobs) with the assistance of CalRecycle staff.
- Provide more technical assistance to counties. Set up regional workshops for counties that that are not frequent RAC users.
  - CalRecycle Comment —This is also being done by Jacobs and CalRecycle staff.
- Work with Caltrans (HQ) to set up training with district offices; do technical training at regional offices and coordinate with county users. .
  - CalRecycle Comment—Caltrans does its own training and we are already working with the county users through Jacobs.
- Highlight maintenance use of rubber-containing products (crack sealant).
  - CalRecycle Comment—Expected use of rubber low.
- Develop campaign targeting municipal/civic leaders to make them aware of RAC noise reduction (which reduces the size/cost of sound walls) and RAC life-cycle cost advantages.
  - CalRecycle Comment—This is already being done with the Green Roads contractor (Katz).

- Maintain/expand the cooperative buying program for rural counties
  - CalRecycle Comment—This work is already being done by Jacobs with the assistance of CalRecycle staff.
- Make the technical assistance program more aggressive—approach counties instead of waiting for them to approach the technical center.
  - CalRecycle Comment—See above.
- Focus RAC grants on areas that have limited ground rubber. Other areas will continue to use RAC regardless of funding.
  - CalRecycle Comment—The availability of crumb rubber is not the limiting factor. Rather, new markets need to be established through technical training, regional seminars, and materials procurement program. Need tiered approach where first-time users are given priority and highest rebate amounts and limited to the first two years than grants to material procurement program participants. Ongoing users should be given nothing.
- Institute reporting requirements for local governments to report usage of RAC and conventional materials.
  - CalRecycle Comment —Good idea for TBAP working with STAR staff and Jacobs.
- Life-cycle cost analysis being conducted at Chico State (by Dr. Hicks) could be helpful in convincing local governments that RAC makes sense, financially, and will hopefully make communities less dependent on grants.
- There is a movement to “green” the highways. The federal government is trying to develop a LEED-type rating system for highway construction. This could help promote RAC. There would be no need for grants if this happens. Everyone is looking at reducing their carbon footprint. California seems like it would be able to successfully implement such a program.
- If terminal blend is added to RAC grants, remember that terminal blend uses about 60 percent less rubber.

### **Reuse/Export**

- Don’t focus here. There are inherent limits on tires reuse that limit the potential for growth.
- Work against tire aging legislation that may limit or prohibit the reuse of tires.
- Export markets are too variable to be a focus—too many factors make the marketplace shift dramatically, e.g., the value of the dollar, the economy, export laws, shipping rates, etc.

### **Report Content**

- Report should include recommendations and conclusions regarding program “tweaks” that Beck would recommend.
- Look at what will happen if (programs supporting TDF are) not an option.
- Need to look at the impacts of money spent—cost per PTE of grant money.
- Need to look at the impacts of reducing government money.
- Need to consider impact of a reduced tire fee/decreased funding as of 2015. How to live within the budget—reallocate money.



- “High compliance rates without market constraints” does not summarize the goal. For example, tire pieces in landfills are fine from the perspective of health and safety, but it is a waste of resources to cut and landfill tires. Bans, restrictions, EPR, deposits, and similar policy mechanisms might put “constraints” on the market, but should they be removed from consideration?

# Appendix D

## Basis for Market Growth Estimates to 2015

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Table D-1 shows the disposition of California tires in 2008 and the predicted annual growth based on a regression analysis of market data from 2003-2008. In many cases, data for subcategories were only available for 2007 and 2008, which is insufficient for regression analysis or for confidence in making future projections. Furthermore, historical trend data for certain categories were not believed to be good indicators of future growth potential for those categories due to recent market changes or CalRecycle initiatives in the marketplace. For those reasons, R. W. Beck made adjustments to the growth rates to be used for projecting the future number of tires to be diverted by 2015. These adjusted figures and R. W. Beck's basis for making the adjustments are also shown in the table and further discussed in the text that follows the table.

Table D-1. Basis for Market Growth Estimates to 2015

Category	Sub-Category	2008 Million PTEs	Regression Analysis Predicted Growth/Yr. Million PTEs, %, (r <sup>2</sup> ) <sup>1</sup>	R. W. Beck Adjusted Growth Rate	Basis for R. W. Beck Adjustment
Export	Waste Tires	2.19	237%	6%	Growing Chinese demand, more reasonable growth rate
	Used Tires (Exported)	1.51	-6%	1%	Understood to be stable and not declining.
	<b>Subtotal</b>	<b>3.69</b>	-0.19, 5.1% (0.23)	4%	
Reuse	Retread	4.42	0.003, 0.1% (0.43)	regression <sup>2</sup>	
	Used Tires (Domestic)	1.85	0.05, 2.5% (0.09)	regression <sup>2</sup>	
	<b>Subtotal</b>	<b>6.27</b>			
Ground Rubber	RAC & Other Paving	4.32	0.40, 6.8% (0.67)	9.4%	Growing local use has only recently become significant
	Turf & Athletic Fields	2.44	-2%	10%	Industry trend information (insufficient California data)
	Loose-Fill Playground/Bark/Mulch	1.15	NA	8.3%	Assume Bark/Mulch segment experiences growth based on current CA trends, stakeholder perspectives and relatively higher growth on the East Coast. Anticipate new test protocols will not favor loose-fill playground material.
	Pour-in-Place Playground	0.45	73%	10%	Anticipate new test protocols will favor pour-in-place, adjusted to a more reasonable growth rate.
	Mulch/Bark	0.37	-5%	5%	Industry trend information (insufficient California data).
	Molded & Extruded	1.15	13%	8%	Industry trend information (insufficient California data).
	Other	0.46	-5%	8%	Industry trend information (insufficient California data).
	<b>Subtotal</b>	<b>10.05</b>	0.47, 6.7% (0.51) <sup>2</sup>	8%	
Civil Engineering	Landfill Applications	2.06 <sup>5</sup>	-19%	1%	Assumed CalRecycle success in growing this category.
	Non-Landfill Applications	0.73	-26%	26%	Assumed CalRecycle success in growing this category.
	<b>Subtotal</b>	<b>2.79</b>	0.38, 7.7% (0.60)	14%	
<b>Alternative Daily Cover (ADC)</b>		<b>2.06</b>	-0.56, -27% (0.78)	0%	Assumed outlet for material when civil engineering projects are not ongoing (no growth, no loss).

Category	Sub-Category	2008 Million PTEs	Regression Analysis Predicted Growth/Yr. Million PTEs, %, ( $r^2$ ) <sup>1</sup>	R. W. Beck Adjusted Growth Rate	Basis for R. W. Beck Adjustment
<b>Other Recycling</b>		<b>0.08</b>	-20%	0%	Industry trend information (California data not useful due to category definition changes).
<b>Tire-Derived Fuel (TDF)</b>	Cement	6.67	1%	regression <sup>2</sup>	
	Cogeneration	0.83	-25%	-4%	Another facility ceasing the use of TDF in 2010, adjusted to a more reasonable decline rate.
	<b>Subtotal</b>	<b>7.50</b>	0.002, 0.0% (0.00)		
<b>Landfill Disposal</b>		<b>12.35</b>			
<b>Total Generated</b>		<b>44.79</b>	1.15, 2.6% (0.86)	2.3% <sup>4</sup>	Assumes tire growth parallels that of population.
<b>Total Diverted from Landfill</b>		<b>32.44</b>			

<sup>1</sup> Where a regression analysis could be performed, three values are presented—an annual growth figure in millions of PTEs, an annual average growth rate, and an  $r^2$  value. The regression analysis was based on data from 2003-2008 and produced a set of linear equations ( $y=mx+b$ ), one for each category. For a number of subcategories, specifically the ground rubber subcategories (except for RAC) and export subcategories, subcategory breakout data were only available for 2007 and 2008. For those subcategories a regression analysis was not performed and only a simple one year percent change value was calculated (from 2007 to 2008). The average growth rate percentage was calculated by dividing the forecasted annual growth from the regression analysis by the estimated market size value in 2012 (derived using the regression formula) to present an “average” rate figure for the period from 2009-2015.  $r^2$  is an indicator of how well the regression formula that was produced fits the data for each subcategory. A value near 1 denotes an extremely good fit, whereas the quality of the formula as a predictor of data falls as  $r^2$  approaches zero.

<sup>2</sup> R. W. Beck used the regression value for future projections.

<sup>3</sup> Includes all ground rubber subcategories except for RAC, which has had a longer term during which data have been gathered compared to the other ground rubber subcategories.

<sup>4</sup> Based on forecasted population growth.

<sup>5</sup> This 2008 estimate for landfill civil engineering use should not be used as a benchmark for evaluating future trends as it was necessarily based on reported use that in some cases could not be validated by CalRecycle, and which may not constitute civil engineering uses as defined by CalRecycle. CalRecycle intends to define specific landfill civil engineering applications for TDA and establish a confirmed baseline when conducting the 2010 market analysis in early 2011.

Listed below are categories where R. W. Beck adjusted predictive formulae to better reflect forward looking trends, and our assumptions that resulted in us making our adjustments.

- **Exports**—Exports of waste tires can fluctuate wildly from year-to-year, making it difficult to model long-term trends. R. W. Beck is aware that the export of waste tires to China is increasing, where they are used either as an energy source or for materials in manufacturing. Unlike much of the world, China's economy did not go into recession in 2008-2009, and we expect China's economic growth rate to return to the high levels seen before the worldwide economic slowdown, result in increasing demand for resources from outside its country into China. Because the waste tire export growth from 2007-2008 is not sustainable over a longer period of time, R. W. Beck adjusted the growth rate to a strong yet moderate annual increase.
- **Ground Rubber**—A regression analysis of ground rubber markets in the aggregate projects that they will grow by an average of 6.7 percent for the next five years. R. W. Beck believes that local government use of crumb rubber in RAC did not become apparent in market figures until very recently and is not well reflected in past historical data, so we adjusted the expected growth of that subcategory upward. Furthermore, CalRecycle continues to invest in market development and stimulate market demand for ground rubber products through grants, which are expected to continue to lead to growth in ground rubber markets in general. We adjusted growth among the subcategories of ground rubber as further described below, in order to more closely align subcategory growth with where it is expected.
  - **Rubberized Asphalt Concrete (RAC)**—Local governments that were introduced to RAC through grants now seem to be increasingly using the product on their own without the need for ongoing grant support. The impact of this is only now being felt, although it is muted by imports of crumb rubber from outside of California because the use of crumb rubber from California tires is often not part of local government specifications. R. W. Beck increased the growth rate to reflect the growing municipal demand.
  - **Turf and Athletic Fields**—Use of crumb rubber from tires as infill between the blades of artificial turf in athletic field installations continues to grow. This growth is not well shown in the statistical data due to the short two-year period in which data were collected separately for this subcategory, which seemed to indicate a downward trend. Nationally, synthetic turf installations grew by 20 percent in 2008. Because the market is still growing, we believe that growth will increase significantly in the next couple of years, and then begin to decline in the long term as the market becomes more fully penetrated. Furthermore, we have assumed that research funded by CalRecycle and conducted by the California Office of Environmental Health Hazard Assessment (OEHHA) will counter safety myths so that further penetration in this market is not adversely affected in the next few years. For these reasons we have adjusted the growth of this subcategory upward over the short term.
  - **Playgrounds**—There is the potential for new testing methods currently under review for disability access and fall safety to cause changes in how certain materials qualify compared to alternatives. Specifically, there is the potential that pour-in-place may become more sought after than loose-fill ground rubber, and that the demand for tire products in general may outpace non-tire materials. The statistical data for pour-in-place playgrounds is only based on a short two-year period in which playground data were collected as separate subcategories, and likely reflected the results of higher than average CalRecycle TDP grant funds going to playground applications. Because the higher growth levels are not sustainable, and because TDP grants are planned to decrease in the future, R. W. Beck chose to use a more moderate growth rate, focused on the pour-in-place category.
  - **Loose-Fill Playground/Bark/Mulch**—Bark and mulch has grown steadily in recent years, including significant amounts of imports. (Some retreader buffing are also used as mulch, but are not included in market statistics focused on use of whole tires.) Some stakeholders feel there is significant potential for growth in this segment as West Coast use is much lower than levels on the East Coast. Loose-fill playground surfacing has appeared to hold steady in recent years, with some

alluding to growth in residential uses. A new specification under development in relation to the Americans with Disabilities Act could reduce use of loose-fill rubber in playgrounds.

- **Molded and Extruded**—Molded and extruded products made from recycled tire rubber are expected to grow, but their potential is limited by the lack of suppliers of ultra-fine mesh rubber in California. The statistical data for this subcategory is only based on a short two-year period in which data were collected separately, so we adjusted the growth rate downward to a more modest level given supply limitations.
- **Civil Engineering**—CalRecycle continues to focus on growing this market segment and has funded large projects in recent years. However, there are obstacles that can limit growth, including large yet sporadic transportation-related projects. While there is great potential for significantly more use, concerted effort by CalRecycle to grow this market is required. We adjusted the apparent growth upward under the assumption that CalRecycle is effective in stimulating demand in large lightweight fill projects (non-landfill applications). We estimated that landfill uses will experience only a modest increase because CalRecycle has been less aggressive in promoting landfill applications compared to other civil engineering uses. Also, there is a need to confirm the baseline level of landfill civil engineering uses. As noted above, the 2008 estimate includes some reported uses that could not be validated as constituting civil engineering applications. Despite uncertainty over the 2008 baseline, there is agreement among CalRecycle, R.W. Beck, and the TDA Technical Assistance contractor, Kennec, that there is significant room for growth.
- **Alternative Daily Cover**—The expansion of the ground rubber and civil engineering markets in Northern California has contributed to a steep decline in the use of tires for alternative daily cover. In R. W. Beck's opinion this trend will level off shortly, and we made adjustments to reflect this assumption.
- **Tire-Derived Fuel**—Cement kilns are believed by R. W. Beck to continue to supplement their primary fuels with tires at the same growth rate as predicted by the regression analysis (approximately 1 percent per year). Although a reduction in the use of tires by cement kilns was believed to have occurred in 2009 and 2010 due to the economic recession, this long-term analysis assumes that any such reduction is temporary, and that cement industry usage will return to pre-recession usage levels, after which it will continue to grow at a slow and stable rate. However, use of TDF in cogeneration facilities is declining because those facilities are converting to using renewable fuel such as biomass in response to California's renewable energy portfolio standard, which does not include TDF as a qualifying renewable material. Because plant shutdowns made the drop in demand from 2007-2008 appear worse than would be the case in a typical year, we adjusted the overall annual decline to a more reasonable and steady decrease.

A more in-depth discussion of tire markets and market trends is found in a companion document to this report "Tire Market Penetration Report," May 2010.

# Appendix E

## Market Development Budgets

The annual budgets for FY 2009/10 through 2013/14 presented in the Fifth Edition Five-Year Plan are by the following broad program types under the Tire Programs and administrative cost categories, including:

- Enforcement and Regulations
- Hauler and Manifest Programs
- Cleanup, Abatement, and Remedial Action
- Research Directed at Promoting and Developing Alternatives to Disposal
- Market Development and New Technology Activities
- Program Staffing and Administration
- Administration
- Mandatory Contracts

The emphasis of the evaluation report is market development programs. However, it is important to have a broad understanding of how funds are allocated over all of the programs.

As presented in the Fifth Edition Five-Year Plan, the broad budgets listed above are as presented in Table E-1.

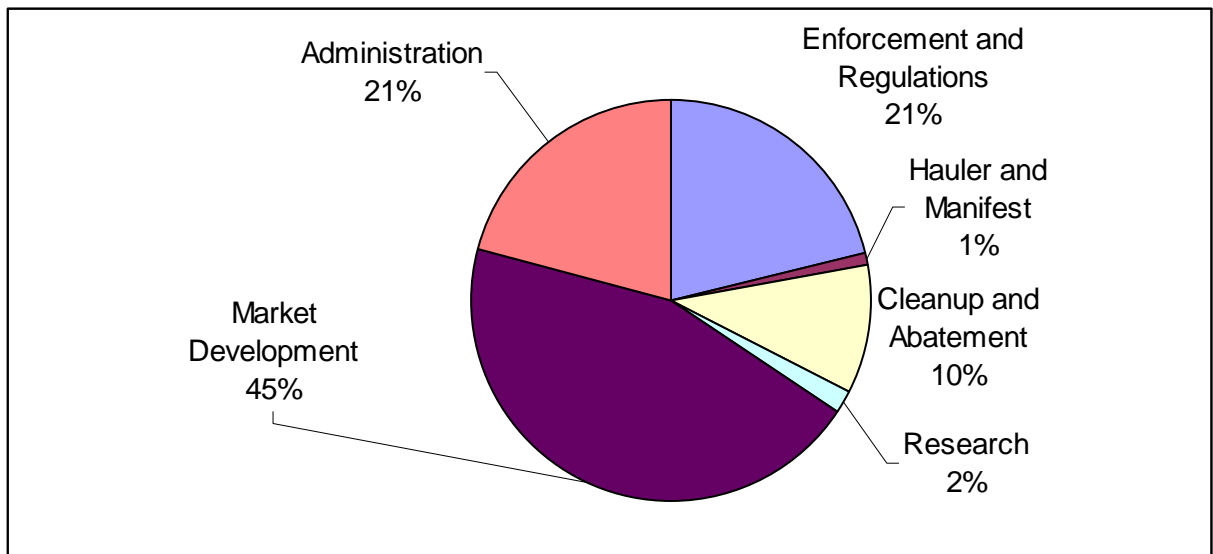
**Table E-1. Annual Tire Program Budgets Presented in Fifth Edition Five-Year Plan (In \$Thousands)**

Program	2009/10	2010/11	2011/12	2012/13	2013/14	Average Annual	Five-Year Total
Enforcement and Regulations	\$7,601.3	\$8,360	\$8,360	\$8,840	\$9,090	\$8,450.3	\$42,251.3
Hauler and Manifest	\$325	\$450	\$450	\$450	\$450	\$425	\$2,125
Cleanup, Abatement, and Remedial Action	\$4,500	\$4,100	\$4,100	\$4,000	\$3,900	\$4,120	\$20,600
Research	\$1,150	\$850	\$100	\$500	\$1,000	\$720	\$3,600
Market Development	\$21,457.7	\$21,274	\$21,124	\$13,106	\$12,456	\$17,883.5	\$89,417.7
Program Staffing and Administration	\$4,924	\$4,916	\$4,916	\$4,916	\$4,916	\$4,917.6	\$24,588
Administration	\$1,832	\$1,832	\$1,832	\$1,832	\$1,832	\$1,832	\$9,160
Mandatory Contracts	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$7,500
<b>Total</b>	<b>\$43,290</b>	<b>\$43,282</b>	<b>\$42,382</b>	<b>\$35,144</b>	<b>\$35,144</b>	<b>\$39,848.4</b>	<b>\$199,242</b>

When the entire five-year budgets are considered, the allocation of the tire budgets are as divided in Figure E-1. In Figure E-1, the budgets for Staffing and Administration, Administration, and Mandatory Contracts are combined into one category, simply called “Administration,” for simplification.



**Figure E-1. Broad Tire Program Five-Year Budgets as Presented in Fifth Edition Five-Year Plan**



For the purposes of our analysis, it was beneficial to identify, to the extent possible and practicable, true market development budgets. Therefore, certain budgets were removed from the “market development” category, and certain budgets were added, to conform with our definition of market development activities. For example, research is a separate category from market development in the Five-Year Plan, however in actuality, most of the research projects that have been undertaken and that are currently in progress are aimed at enhancing markets for scrap tires or tire-derived products. Therefore, R. W. Beck moved the “research” budget into the market development category (as a subset) but removed non-market development research projects that could be identified, and included them in a separate category (outside of market development) called “other.”

Similarly, the market development category is comprised of several different types of programs, including some that are not truly market development programs. These include:

- Some outreach campaigns
- Technical assistance for State of Baja California’s development of Integrated Waste Tire Management Plan
- Sharing of environmental education materials throughout the border region

While these programs may be beneficial to the tire program as a whole, they do not advance the development of tire markets, therefore R. W. Beck further adjusted the market development budget by excluding the budgets associated with these programs (or the portions of these programs that can be identified as non market-development) and also put these budgets into the more broad tire program category (outside of the market development category) entitled “other.” The adjustments are shown in more detail, by programs and how they are allocated into various market development mechanisms, in Table E-2.

**Table E-2. Adjusted Market Development Annual Budgets**

<b>Mechanisms/Programs</b>	<b>FY 2009/10</b>	<b>FY 2010/11</b>	<b>FY 2011/12</b>	<b>FY 2012/13</b>	<b>FY 2013/14</b>	<b>Five-Year Total</b>
Tire Events	\$118,000	\$75,000	\$30,000	\$100,000	\$100,000	\$423,000
<b>Education Subtotal</b>	<b>\$118,000</b>	<b>\$75,000</b>	<b>\$30,000</b>	<b>\$100,000</b>	<b>\$100,000</b>	<b>\$423,000</b>
RAC Grant Programs	\$3,850,000	\$3,509,334	\$3,600,000	\$3,500,000	\$2,500,000	\$16,959,334
Rubberized Chip Seal Grant Program	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$1,500,000	\$9,500,000
Tire-Derived Product Grants	\$3,300,000	\$3,400,000	\$3,400,000	\$2,000,000	\$2,000,000	\$14,100,000
Tire Equipment Loan Program	\$4,000,000	\$4,000,000	\$4,000,000	\$0	\$0	\$12,000,000
Web-Based Grant Management System	\$150,000	\$0	\$0	\$0	\$0	\$150,000
<b>Funding Subtotal</b>	<b>\$13,300,000</b>	<b>\$12,909,334</b>	<b>\$13,000,000</b>	<b>\$7,500,000</b>	<b>\$6,000,000</b>	<b>\$52,709,334</b>
Outreach Campaigns	\$3,300,000	\$3,300,000	\$3,200,000	\$1,500,000	\$1,500,000	\$12,800,000
CalMAX and WRAP <b>OUTREACH</b>	\$24,666	\$24,666	\$24,666	\$24,666	\$24,666	\$123,330
<b>Outreach Subtotal</b>	<b>\$3,324,666</b>	<b>\$3,324,666</b>	<b>\$3,224,666</b>	<b>\$1,524,666</b>	<b>\$1,524,666</b>	<b>\$12,923,330</b>
Outreach Adjustment <sup>1</sup>	(\$883,802)					
<b>Outreach Adjusted Subtotal</b>	<b>\$2,440,864</b>	<b>\$3,324,666</b>	<b>\$3,224,666</b>	<b>\$1,524,666</b>	<b>\$1,524,666</b>	<b>\$12,039,528</b>
CE Applications for Waste Tires	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$2,500,000
Research on Highway Construction Applications Using Waste Tires	\$500,000	\$0	\$500,000	\$0	\$500,000	\$1,500,000
Artificial Turf Study (Phase 2)	\$0	\$200,000	\$0	\$0	\$0	\$200,000
Minimum Energy Efficiency for Tires	\$150,000	\$150,000	\$0	\$0	\$0	\$300,000
<b>Research Subtotal</b>	<b>\$1,150,000</b>	<b>\$850,000</b>	<b>\$1,000,000</b>	<b>\$500,000</b>	<b>\$1,000,000</b>	<b>\$4,500,000</b>
Research Adjustment <sup>2</sup>	(\$150,000)	(\$150,000)				
<b>Adjusted Research Subtotal</b>	<b>\$1,000,000</b>	<b>\$700,000</b>	<b>\$1,000,000</b>	<b>\$500,000</b>	<b>\$1,000,000</b>	<b>\$4,200,000</b>
TDA Civil Engineering Technical Support	\$3,250,000	\$1,000,000	\$2,750,000	\$1,361,334	\$1,711,334	\$10,072,668
RAC Technology Centers	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$500,000
RAC Technical Assistance Support	\$1,325,000	\$1,325,000	\$1,325,000	\$500,000	\$500,000	\$4,975,000
TBAP	\$0	\$2,500,000	\$674,334	\$2,000,000	\$2,500,000	\$7,674,334

Mechanisms/Programs	FY 2009/10	FY 2010/11	FY 2011/12	FY 2012/13	FY 2013/14	Five-Year Total
<b>Technical Assistance Subtotal</b>	<b>\$4,675,000</b>	<b>\$4,925,000</b>	<b>\$4,849,334</b>	<b>\$3,961,334</b>	<b>\$4,811,334</b>	<b>\$23,222,002</b>
Technical Assistance for State of Baja California <sup>3</sup>	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$100,000)
Sharing of Environmental Education Materials with Border Region <sup>3</sup>	(\$20,000)	(\$20,000)	0	0	0	(\$40,000)
<b>TOTAL ADJUSTED MARKET DEVELOPMENT BUDGET</b>	<b>\$21,533,864</b>	<b>\$21,934,000</b>	<b>\$22,104,000</b>	<b>\$13,586,000</b>	<b>\$13,436,000</b>	<b>\$92,593,864</b>

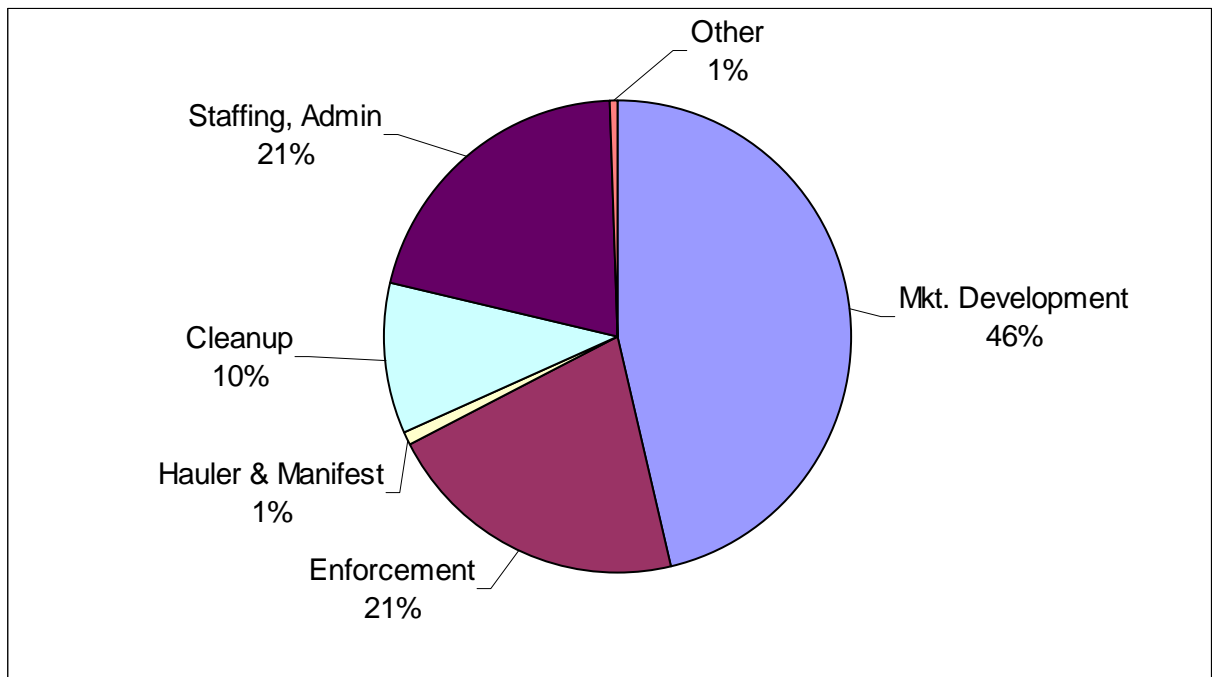
<sup>1</sup> Year 2 of Tire Sustainability outreach project removed, as it is a waste minimization project. Budget is added to "other" category within tire programs.

<sup>2</sup> Minimum Energy Efficiency for Tires research project removed, as it is a waste minimization project. Budget added to "other" category within tire programs.

<sup>3</sup> Not considered a market development program—budget is added to "other" category within tire programs.

When the above adjustments are incorporated, the adjusted tire program budgets from the Fifth-Edition Five-Year Plan are as described in Figure E-2.

**Figure E-2. Adjusted Tire Program Five-Year Budgets**



As Figure E-2 indicates, the adjusted market development portion of the five-year budget is estimated to comprise approximately 46 percent of the tire markets budget. This is a total of \$92,593,864 over the five-year period, or an average of \$18,518,773 per year over the five-year period, of a total tire program five-year budget of \$200,142,000, or an average annual tire program budget of \$40,028,400.

# Appendix F

## Program and Activity Templates

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CalRecycle has made changes to existing market development programs, and introduced new market development programs over the years, in large part in response to stakeholder input, survey responses, and other feedback. It is suggested, however, that CalRecycle utilize a series of templates that would serve to guide them in a systematic way. This will serve to provide a level of objectivity, which will provide the Agency with a certain level of protection.

### ***Gap Analysis***

The first template CalRecycle might consider is a “gap analysis” template that could serve primarily as a planning tool. It would provide a structured manner to consider all of CalRecycle’s existing market development programs and activities, considering the following:

- The market categories/product types they aim to promote;
- Market barriers they aim to address;
- The market development mechanisms employed to overcome the barriers for those product types;
- Objectives of the policy or programs;
- Key performance measures; and
- Performance measurement tracking methods and activity coordinator responsible for tracking performance.

This template is presented in an Excel spreadsheet format, in order to allow convenient sorting capabilities. A portion of the template is shown in Table F-1.

**Table F-1. Gap Analysis Template**

Market Penetration Target			Market Development Mechanisms and Strategies										
Primary Market Sector	Market Sub-Category	Barrier Addressed	Financial Assistance	Business / Technical Assistance	Outreach / Promotion Assistance	Research and Development	Education and Training	Policy	SMART Objective	Market Development Program Utilized to Implement Mechanism	Key Performance Measures	Performance Tracking Method	Program/Activity Coordinator
Ground Rubber	Turf and Athletic	Health and safety concerns				1) Research health/environmental issues and identify existing research 2) Identify	1) Provide links to studies on web site 2) Provide study updates as appropriate at						
Ground Rubber	All	Less costly alternatives exist	1) Provide grants to public entities to spur demand/offset costs	1) Provide marketing assistance promoting product benefits				Mandate that Caltrans use a certain amount of RAC in their paving projects.		1) RAC Grant Program 2) TDP Grant Program	% of paving by Caltrans using RAC	Annual report from Caltrans to CalRecycle	
Ground Rubber	RAC and Other Paving	Competing with subsidized product from out-of-state	1) Provide grants to public entities to spur demand/offset costs							RAC Grant Program		RAC Survey	

## Market Development Activity Proposal Form

A second template that is recommended is a form on which an activity or program coordinator introduces a market development program or activity. The purpose of the template is to have the proposer clearly identify the product types/markets that will be targeted, and benefits and drawbacks of the market development activity. This template provides a forum on which the activity can be analyzed in terms of its alignment with the market development strategic directives and priorities. The proposer will identify the primary market development mechanism to be utilized, describe the appropriateness of the target market sector, as well as the appropriateness of the mechanism as a means to overcome the barrier. In addition, the proposer will describe how the activity will coordinate with other mechanisms and/or programs, as well as the type of coordination that would be required with other programs, agencies, or organizations. Further, clear objectives and measures of success will be established. Table F-2 provides a sample template of such a form.

**Table F-2. Market Development Activity Proposal Form**

1. Program/activity being introduced	
2. New program or change to an existing program?	New <input type="checkbox"/> Change to Existing <input type="checkbox"/> If change, indicate program
3. Date	
4. Introduced by	
5. Description of program	
6. Product type(s) targeted	
7. Barrier(s) to be addressed	
8. Targeted participants	
9. Primary mechanism type	
10. Other mechanisms that will be leveraged	
11. Required coordination with other mechanisms/ programs	
12. Required coordination with other agencies/ organizations	
13. Objective(s) of activity	
14. Performance measurement(s)	
15. Resources required	
16. Policy/legislative change(s) required	
17. Benefits of activity	
18. Drawbacks of activity	

## Program/Activity Evaluation Form

A third type of template that CalRecycle should consider implementing is policy evaluation form. This template provides a systematic way of “scoring” a program or activity, relative to priorities set by CalRecycle. It is a means of vetting the program, in a “go/no go” situation. The sample template, for example, requests information about whether a priority market sector is addressed, whether a priority barrier is addressed, what the market diversion potential of the program is, whether the activity would result in a sustainable marketplace, what the timeframe of the results would be, and what resources/policy changes would be required to implement the program or activity. This type of template could be particularly helpful when weighing the appropriateness of more than one potential activity, as the activity’s relative “scores” could be compared. The score itself is less important than the process of identifying, comparing, and discussing the various characteristics of the potential activity.

The sample templates provided could be modified as CalRecycle considers appropriate. The main goal is that they provide an objective forum to consider the aspects of market development activities, and how they align with CalRecycle’s strategic initiatives and priorities. CalRecycle could also choose to develop a different scoring system on the Activity Evaluation Form, which might weigh certain criteria more heavily than others.

**Table F-3. Program/Activity Evaluation Form**

<b>Program/Activity</b>				
<b>Program/Activity Coordinator</b>				
<b>Date</b>				
	<b>1</b>	<b>0</b>	<b>-1</b>	<b>Score</b>
Addresses Priority Market Sector?	Addresses high priority market	Addresses medium priority market	No	
Addresses Priority Barrier?	Yes	Addresses medium priority barrier	No	
Market Diversion Potential	High	Medium	Low	
Results in Sustainable Marketplace?	Yes	Possibly	No	
Complements Other Programs	Yes		No	
Require Policy Change?	Yes	Possibly	No	
Resources Needed	High	Medium	Low	
Timeframe of Results	Long	Medium	Short	
<b>TOTAL</b>				



# Appendix G

## Cost and Diversion Analysis Assumptions

This appendix summarizes the assumptions used to analyze diversion and cost impacts for six of the seven funding options evaluated in Section 6. Funding assistance option 1.6, Innovation Grants, is not analyzed because it is specifically intended to result in hard-to-predict proposals that could have any number of outcomes. Other policy options are evaluated to the extent possible based on diversion and cost as described in the text of Section 6.

Table G-1 lists the assumptions for 2008 generation and 2015 baseline projections, as described in Section 2 and supported by Working Paper #1: Market Penetration Report. The baseline projections assume that the recently strong market expansion trends continue without major threats materializing which could reduce any one market segment (including the threat of a new federal rule that could potentially impact TDF use significantly). While there is significant uncertainty in the baseline projections, they convey the likelihood of growing waste tire generation (especially in the wake of recent recession induced slumps) and the relative magnitude of growth required to achieve the 90 percent goal.

The third column in Table G-1 presents one scenario for achieving the 90 percent goal by 2015. In this scenario, the market segments shaded with diagonal lines were increased relative to the baseline projection in order to achieve a 90 percent diversion rate. It is but one of many possible scenarios, but it conveys the very high, sustained growth that would be required in the top priority market segments in order to achieve a 90 percent diversion goal, with RAC doubling, molded-extruded products nearly tripling, and civil engineering nearly doubling over 2008 levels.

**Table G-1. Current, Baseline Projection and 90 Percent Diversion Scenarios (Million PTEs)**

Market Segment	2008 Generation	2015 Baseline	2015 90 Percent Scenario
Ground Rubber	10.1	16.1	19.2
<i>RAC</i>	<i>4.3</i>	<i>6.1</i>	<i>7</i>
<i>Turf</i>	<i>2.4</i>	<i>3.9</i>	<i>3.9</i>
<i>Pour in Place Play</i>	<i>0.5</i>	<i>1.2</i>	<i>1.2</i>
<i>Loose-fill/Bark/Mulch</i>	<i>1.2</i>	<i>2</i>	<i>2.7</i>
<i>Molded/Extruded</i>	<i>1.2</i>	<i>2</i>	<i>3.5</i>
<i>Other</i>	<i>0.5</i>	<i>0.9</i>	<i>0.9</i>
<b>Civil Engineering</b>	<b>2.8</b>	<b>5</b>	<b>6.5</b>
<i>Transportation CE</i>	<i>0.7</i>	<i>3</i>	<i>3.5</i>
<i>Landfill CE</i>	<i>2.1</i>	<i>2</i>	<i>3</i>
Reuse	6.3	6.5	6.5
Alternative Daily Cover	2.1	2.1	2.1
TDF	7.5	7.7	7.7
Exports	3.7	5.3	5.3
Other Uses	0.1	0.1	0.1
<b>Total Diversion</b>	<b>32.6</b>	<b>42.8</b>	<b>47.4</b>

Market Segment	2008 Generation	2015 Baseline	2015 90 Percent Scenario
Diversion Rate	72%	81%	90%
Disposal	12.4	10.1	5.5
Total Generated	45.0	52.9	52.9

Table G-2 on the following pages lists a number of specific assumptions and examples illustrating the potential costs and diversion impacts of optional funding policies, as referenced in the text of Section 6. These are merely intended to be examples of possible scenarios involving the policies, which each have many nuances that could significantly alter the analysis, depending on how they are ultimately defined and implemented.

**Table G-2. Detailed Assumptions Used in Funding Options Analysis**

Option	Example Description	Covered PTE Assumed Based on 2008 and 2015 90% Diversion Scenario (million PTE)		Assumed Unit Cost (\$/PTE)	Unit Cost Assumptions	Total Cost (\$ Million)		Other Notes
		Low	High			Low	High	
1.1 Supplier Subsidies (Ongoing, per ton Payments)	A - TDA and ground rubber - Low Payment	12.9	25.7	\$0.20	Lower range of subsidies provided by some states	\$2,580,000	\$5,140,000	Administrative costs not included. New regulations and staff required for set up, payment processing, fund management, compliance monitoring and enforcement. "Diversion" refers to tons processed or TDPs produced, not necessarily new diversion.
	B - TDA and ground rubber - Medium Payment	12.9	25.7	\$0.50	Medium range of subsidies provided by some states	\$6,450,000	\$12,850,000	
	C - TDA and ground rubber - High payment	12.9	25.7	\$1.00	High subsidy range similar to a couple of states, still less than typical in Canadian provinces	\$12,900,000	\$25,700,000	
	D - All Tires - Medium Payment	32.6	47.4	\$0.50	Medium subsidy range applied to all diverted tires for comparison	\$16,300,000	\$23,700,000	
1.2 Consumer Subsidies (Rebate)	A - TDA Only	2.8	6.5	\$0.20	Low range to provide meaningful subsidy relative to aggregate prices	\$560,000	\$1,300,000	Administrative costs not included. New regulations and staff required for set up, payment processing, fund management, compliance monitoring and enforcement. "Diversion" refers to products purchased that qualify for funding, not necessarily new diversion.
	B - Molded Products and Bark/Loosefill, Wholesale to Govt (25% of production)	0.6	1.6	\$2.00	Half of lower end of typical TDP grant costs	\$1,200,000	\$3,100,000	
	C - RAC	4.3	7.0	\$1.50	Midpoint of typical RAC use grant costs	\$6,450,000	\$10,500,000	
	D - Molded products and Bark/Loosefill, Retail Sales to Individuals (assumes 15% of production in 2008; 30% in 2015)	0.4	1.9	\$2.50	25% higher than scenario B - would be applied at a consumer level to relatively high cost products compared to wholesale	\$900,000	\$4,650,000	
	E - Subtotal	8.1	16.9			\$9,110,000	\$19,550,000	

Option	Example Description	Covered PTE Assumed Based on 2008 and 2015 90% Diversion Scenario (million PTE)		Assumed Unit Cost (\$/PTE)	Unit Cost Assumptions	Total Cost (\$ Million)		Other Notes
1.3 Transportation Subsidies	A - TDA, assume 50% eligible	1.4	3.3	\$0.44	Based on \$0.11 per tire per 100 miles; assumes average distance of 400 miles	\$616,000	\$1,430,000	Administrative costs not included. New regulations and staff required for set up, payment processing, fund management, compliance monitoring and enforcement. "Diversion" refers to tons shipped qualifying for the subsidy, some of which may occur without funding.
	B - RAC, assume 20% eligible	0.9	1.4	\$0.44		\$378,400	\$616,000	
	C - Subtotal	2.3	4.7			\$994,400	\$2,046,000	
1.4 Supplier Grants	A - Current Program @ \$1.85 million per year and .01-.02 tons capacity per \$	1.2	6.1	\$0.40 - \$2.00	Based on range from last four tire equipment loans	\$2,400,000	\$2,400,000	Total cost based on current average annual amount allocated to Tire Loan Program for comparison. "Diversion" refers to tons per year of new production capacity, not necessarily new diversion.
1.5 Consumer Grants	A - Current Targeted RAC Grants	0.3	0.4	\$9.13 - \$10.17 per tire	Based on current averages for targeted RAC grant applications	\$3,391,000	\$3,391,000	Assumes average annual budget as in current Five Year Plan. "Diversion" refers purchased products, some of which may have been purchased without grant funding.
	B - Current Chip Seal Grants	0.2	0.2	\$12.32 per tire	Based on current averages for the chip seal program applications	\$1,900,000	\$1,900,000	
	C - Current TDP Grants	0.6	0.7	\$3.95 - \$4.98 per tire	Based on current averages for the TDP grant program applications	\$2,820,000	\$2,820,000	
	D - Subtotal	1.1	1.2			\$8,111,000	\$8,111,000	
1.7 Supplier Loans	A - Current Program @ \$1.85 million per year and .01-.02 tons capacity per \$	1.2	6.1	\$0.40 - \$2.00	Based on range from last four tire equipment loans	\$2,400,000	\$2,400,000	Same analysis as for supplier grants (option 1.4) for comparison, except that loan costs are repaid providing greater leverage and cost efficiency

# Appendix H

## Rationale Used to Develop Recommendations

Table H-1 lists examples of the rationales used to develop recommendations presented under Scenario 1 in Section 7. For brevity, only a sampling of factors considered are listed to illustrate the process.

**Table H-1 Selected Key Rationale Used in Developing Recommendations**

<b>Mechanism</b>	<b>Broad Programmatic Recommendations</b>	<b>Criteria 1 – Likely Diversion Impact</b> <i>Helps target top-priority opportunities and/or barriers; Builds on lessons learned regarding effectiveness and/or efficiency</i>	<b>Criteria 2 – Relative Cost and Stakeholder Impacts</b> <i>Implements highest “bang for buck” options and/or addresses stakeholder concerns regarding current/potential approaches</i>	<b>Criteria 3 – Implementation Feasibility and Issues</b> <i>Addresses CalRecycle goals, desired outcomes and principles, and/or other implementation concerns</i>
Planning & Performance Measurement	1. Continue to conduct a transparent Five-Year Plan development process with ample opportunity for stakeholder input.	X Helps identify and evaluate market development options.	X Identifies stakeholder concerns and perspectives on effectiveness and cost-effectiveness.	X Motivates market players; Keeps focus on stated goals and principles.
	2. Formalize the strategic framework used in Five-Year Plans.	X Ensures activities are tied to diversion needs.		X Ties to broader tire program goals; Builds internal capacity, provides framework for prioritizing programs and mechanisms.
	3. Coordinate evaluation and planning activities across programs.	X Allows for enhanced leverage of efforts among programs to further enhance diversion.	X Critical to using overall resources efficiently.	X Builds internal capacity.

<b>Mechanism</b>	<b>Broad Programmatic Recommendations</b>	<b>Criteria 1 – Likely Diversion Impact</b> <i>Helps target top-priority opportunities and/or barriers; Builds on lessons learned regarding effectiveness and/or efficiency</i>	<b>Criteria 2 – Relative Cost and Stakeholder Impacts</b> <i>Implements highest “bang for buck” options and/or addresses stakeholder concerns regarding current/potential approaches</i>	<b>Criteria 3 – Implementation Feasibility and Issues</b> <i>Addresses CalRecycle goals, desired outcomes and principles, and/or other implementation concerns</i>
	4. Strengthen objective-setting and performance measurement activities.*	X Provides a road map for achieving diversion goals.	X Can help ensure that resources are allocated to programs and mechanisms with greatest diversion impacts.	X Critical to measuring performance.
Research and Development	5. Maintain a prioritized research agenda that includes activities across programs and that identifies dissemination and follow-up needs.		X Helps ensure R&D funds are applied where needed and allocated efficiently.	X Builds internal capacity through cross-fertilization.
	6. Enhance the annual tire market studies by adding elements that support the Five-Year Plan.	X Provides information needed to properly target activities.		X Builds internal capacity; Measures progress.
	7. Establish a new research activity to compile TDP performance and cost information on an ongoing basis from CalRecycle programs, original research and other sources.*	X Addresses a major barrier to several priority market segments.	X May enhance demand for TDPs based on product attributes and life-cycle cost benefits, which may reduce the need for TDP grants in the long run.	X Builds capacity and motivates stakeholders by providing clearly understandable information on a key barrier.
	8. Allocate a portion of the market development budget for research on potential new products and technologies that utilize waste tires.	X Ensures that CalRecycle prepares over time to continually diversify markets in the event of market disruptions.		

<b>Mechanism</b>	<b>Broad Programmatic Recommendations</b>	<b>Criteria 1 – Likely Diversion Impact</b> <i>Helps target top-priority opportunities and/or barriers; Builds on lessons learned regarding effectiveness and/or efficiency</i>	<b>Criteria 2 – Relative Cost and Stakeholder Impacts</b> <i>Implements highest “bang for buck” options and/or addresses stakeholder concerns regarding current/potential approaches</i>	<b>Criteria 3 – Implementation Feasibility and Issues</b> <i>Addresses CalRecycle goals, desired outcomes and principles, and/or other implementation concerns</i>
Funding Assistance	9. Continue to refine current consumer grant programs to maximize cost effectiveness and target top-priority expansion and diversification opportunities.	X Keeps grants focused on priority markets.	X Minimizes costs while maximizing bang for buck.	
	10. Shift a portion of funds currently allocated to RAC use grants to support a new TDA funding program.*	X Addresses a key barrier for a priority expansion opportunity.		X Helps diversify markets, which is a stated goal.
	11. Establish a new Market Development Innovations Grant Program.		X Invites new proposals for cost-effective activities that may not have been identified otherwise.	X Motivates stakeholders by incentivizing entrepreneurial activity.
	12. Continue to allocate budget for the Tire Equipment Loan Program, subject to demonstration of the need for any additional proposed production capacity.	X Provides funding for infrastructure where needed, thus addressing supply barriers.	X Market need evaluation addresses concern over exacerbating inadvertent market disruptions.	X Using loans instead of grants is least intrusive, equitable way to support supply infrastructure.
	13. Streamline reporting requirements for funding recipients, but strengthen requirements to participate in surveys and case studies.	X Helps ensure needed data is available to address key barriers.	X Additional data obtained helps ensure that funding is indeed resulting in additional diversion.	



<b>Mechanism</b>	<b>Broad Programmatic Recommendations</b>	<b>Criteria 1 – Likely Diversion Impact</b> <i>Helps target top-priority opportunities and/or barriers; Builds on lessons learned regarding effectiveness and/or efficiency</i>	<b>Criteria 2 – Relative Cost and Stakeholder Impacts</b> <i>Implements highest “bang for buck” options and/or addresses stakeholder concerns regarding current/potential approaches</i>	<b>Criteria 3 – Implementation Feasibility and Issues</b> <i>Addresses CalRecycle goals, desired outcomes and principles, and/or other implementation concerns</i>
Business & Technical Assistance	14. Continue to focus TDA and RAC technical assistance on top-priority opportunities and barriers.	X Focuses technical assistance on key opportunities and barriers.	X Focuses resources where greatest opportunities appear to be for diversion.	
	15. Continue to offer TBAP direct business assistance services, while adjusting program rules that determine how to prioritize applicants.	X Provides firm-specific assistance on expanding/diversifying demand to complement other CalRecycle efforts.		X Addresses desired outcome related to efficient supply infrastructure.
	16. Increase stakeholder buy-in and participation in TBAP sectorwide projects.	X Addresses priority opportunities and barriers.	X Seeks to better tie activities to industry efforts for increased synergy.	
	17. Coordinate technical assistance activities across programs and other market development mechanisms.*		X Seeks to maximize efficiency of technical assistance resources and leverage programmatic efforts across other programs and mechanisms.	X Builds internal capacity.
Education and Training	18. Expand education and training activities and continue to focus them on top-priority market expansion opportunities and barriers.	X Expands and focuses effort to address key education barriers for priority market opportunities.		X Supports stakeholders and builds internal capacity.

<b>Mechanism</b>	<b>Broad Programmatic Recommendations</b>	<b>Criteria 1 – Likely Diversion Impact</b> <i>Helps target top-priority opportunities and/or barriers; Builds on lessons learned regarding effectiveness and/or efficiency</i>	<b>Criteria 2 – Relative Cost and Stakeholder Impacts</b> <i>Implements highest “bang for buck” options and/or addresses stakeholder concerns regarding current/potential approaches</i>	<b>Criteria 3 – Implementation Feasibility and Issues</b> <i>Addresses CalRecycle goals, desired outcomes and principles, and/or other implementation concerns</i>
	19. Maintain a consolidated education and training agenda that is coordinated and synchronized with technical assistance, outreach, and promotion activities.		X Works to ensure education resources are allocated as efficiently as possible.	X Provides an opportunity to obtain information about stakeholder concerns and barriers.
	20. Provide a central access point that consolidates education and training resources.*		X Helps ensure educational resources are utilized to greatest extent possible.	X Helps motivate and support stakeholders by simplifying access to information resources.
	21. Expand partnerships to leverage and institutionalize education and training programs.		X Helps use state educational resources as efficiently as possible.	X Motivates outside stakeholders to promote market development.
Outreach and Promotion	22. Develop a coordinated outreach and promotion plan that integrates activities and performance measurement across programs.	X Helps ensure that resources and efforts target top-priority opportunities and barriers.	X Seeks to use outreach resources efficiently.	X Builds internal capacity.
	23. Maximize efforts targeting high-impact audiences and market segments.	X Targets outreach on priority market expansion opportunities and barriers.		

<b>Mechanism</b>	<b>Broad Programmatic Recommendations</b>	<b>Criteria 1 – Likely Diversion Impact</b> <i>Helps target top-priority opportunities and/or barriers; Builds on lessons learned regarding effectiveness and/or efficiency</i>	<b>Criteria 2 – Relative Cost and Stakeholder Impacts</b> <i>Implements highest “bang for buck” options and/or addresses stakeholder concerns regarding current/potential approaches</i>	<b>Criteria 3 – Implementation Feasibility and Issues</b> <i>Addresses CalRecycle goals, desired outcomes and principles, and/or other implementation concerns</i>
	24. Expand and strengthen CalRecycle outreach and promotion vehicles targeting key customer groups.*	X Increases effectiveness of outreach efforts by promoting common messaging and synergies.		X Motivates and supports external stakeholders.
	25. Increase partnerships within California and externally to promote TDP sales.	X Expands diversion potential by targeting out-of-state markets.	X Leverages state resources to expand impact.	X Supports stakeholders.

\* Top-priority recommendations for new or adjusted current activities in each category are identified with an asterisk.

# Appendix I

## Key Stakeholder Issues and Project Team Responses

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The complete, final draft Waste Tire Market Development Program Evaluation Report was presented and discussed at a public stakeholder meeting held on Aug. 25, 2010. Following is a synopsis of key issues raised by stakeholders, along with responses from R.W. Beck, the report author:

Please note:

- The summary below summarizes the key themes raised during the Aug. 25 workshop. While in some cases specific written or verbal comments are quoted, generally comments were combined and edited for brevity. Names are not provided to avoid potential mischaracterizations of individual perspectives.
- The responses below, as the report itself, are R.W. Beck's. However, R.W. Beck worked very closely with CalRecycle management and staff throughout this project, and the underlying market development goals, desired outcomes, and principles upon which the recommendations are based were prepared early in the project to reflect CalRecycle management perspectives with input from the Project Advisory Group.
- In developing the next Five-Year Plan, CalRecycle will consider past and future stakeholder input, as well as the findings and recommendations in the consultant report. The first stakeholder workshop related to the plan will occur in November 2010 and the plan is scheduled to be finalized in spring 2011.

### 1. GRANTS AND BUDGET ALLOCATIONS

**Issues: When are grants appropriate? Do grants just “buy” demand that only exists because of the grants, or do they catalyze lasting demand that will thrive and grow after the grant ends?**

Examples of Comments:

- The state needs to identify products that need grant support and limit grants only to those products. Otherwise, when the grants go away, the market will go away.
- RAC has been used for 30+ years; it's a very well-established market. The more money that you throw at RAC, the more you that takes away from other programs.

*R. W. Beck Response:*

*These are fundamental issues that arose repeatedly during the project. We were unable to find data that would objectively and conclusively address the question of under what circumstances grants are more or less likely to catalyze lasting demand, versus having limited impact during the grant period only. Anecdotally, it seems clear that some grants do certainly help to catalyze demand, and that the grants do have a positive impact on TDP sales. After careful consideration, we concluded (in recommendation #9 on page 181) that the best approach at this time is to be cautious and strategic in grant making by continuing (as CalRecycle has done for several years)*

*to regularly review grant programs to ensure that they are targeting top priority market segments, that the cost per tire is reduced over time, and that grantees requesting a second grant for the same type of product receive lower priority. We also recommend potentially expanded market research to identify products that may not need state support, and enhanced data gathering from grantees to help evaluate evolving barriers and advantages by product type.*

**Issues: Should funding for grants be cut to shift resources to other approaches? Should CalRecycle wean the industry off of grants slowly? Specifically, is it a bad idea to reduce grants now, given the government budget crunch and uncertain economic future?**

Examples of Comments:

- Even though I am skeptical about the use of grants, I am concerned about reducing grant support for RAC or other products at this time given budget and economic conditions. Local agencies may cut use even if they understand life-cycle cost advantages because they must act based on initial costs and available revenues.
- You can't go cold turkey; grants should be reduced slowly over time to wean the industry slowly.
- It could be detrimental to all TDP (including RAC) markets to cut grants in this economy. However, we need to start building a stronger marketing program through education and outreach so that if and when we do cut back grants we don't see a market retreat as a result.

*R. W. Beck Response:*

*Our recommendations call for establishing a TDA funding program by shifting a portion of funds currently allocated to the RAC Use grants. (See recommendation #10 on page 182.) However, we do not recommend eliminating the program entirely, and we do not make any specific recommendations about how to allocate funds across the different grant programs. The example budget scenario we developed (see page 194) reflects a reduction in the overall funding for grants from 57 percent to 51 percent of available market development funds; however, we did not specifically aim to reduce the grants budget. Rather, this modest reduction in grant funding resulted of our recommendation that funding for outreach and education be increased. We feel the adjustment would be a prudent tradeoff. Moreover, the relatively small reduction in grant funding suggested in the report could test the waters regarding the impact of a reduction in RAC grant funding.*

**Issue: Should CalRecycle pilot the concept of innovation grants, as described under recommendation #11 in the Program Evaluation Report?**

Examples of Comments:

- The innovation grant idea is risky if it is open to just anyone, but may have merit for established companies either in or out of the tire industry to innovatively come up with new products that will consume more crumb rubber and/or tire derived products. The question is what will these grants be able to pay for...investment in equipment to develop the product or business consulting for research/development/testing/marketing/etc?
- There is a need for industry groups like RPA, ISRI, ASGI, etc. to be able to suggest research projects that would benefit the industry as a whole, for example, performance grading of rubberized asphalt. Maybe if a proposal could establish that it would have vast market

development impact they could also supply a list of potential academic entities that could be sent an RFP to be funded by CalRecycle.

- Concerned about the ability to objectively and fairly score and rank proposals if the objectives are open-ended.
- Innovation grants could be structured as part of TBAP. Some of it could be done under the current TBAP program in fact.
- It is a sticky wicket—it opens the opportunity for everyone with an idea to apply for funding, including reinventing the wheel, or to devulcanize or do pyrolysis.
- The California Energy Commission’s PIER grant program is an effective example of this.

*R. W. Beck Response:*

*The innovation grant program concept (See Recommendation #11 on page 183) was intended to provide a vehicle for CalRecycle to catalyze entrepreneurial approaches to market development, possibly spawning innovative approaches that otherwise would not be proposed. Concerns over the potential for receiving proposals that may be “undesirable,” and over fair scoring and ranking are all very legitimate. We respectfully feel these concerns can be addressed through a carefully crafted solicitation and review process. The simplified pre-proposal process included in our recommendation would be key—potential grantees would present 2-4 page concept proposals for review. Only those selected, if any are found to have sufficient merit, would be invited to prepare full proposals. While incorporating the program within TBAP is workable, making the program part of the current business service grants would limit the type of organizations eligible. One option under TBAP would be to invite proposals or concepts to be submitted that might be funded as a sectorwide project under TBAP, potentially involving both individual firms within a sector as well as other organizations that can help achieve broad market development objectives.*

## **2. OTHER NON-GRANT MARKET DEVELOPMENT APPROACHES**

**Issue: What is the proper role for outreach, education, technical assistance, and research in the state’s program?**

Examples of Comments:

- The state needs to focus on “traditional” market development, i.e., providing information to overcome barriers so markets will grow on their own. Especially need to document and make effective arguments regarding higher up-front costs vs. life-cycle cost savings and other benefits.
- There needs to be more focus on education and outreach as market development.
- Need to look at commercial markets mostly—beyond government.
- It seems obvious that the best use of some of these funds would be to somehow “partner” with associations like Rubber Pavement Association (in the case of RAC) that already has an abundance of resources but could use additional funding to get this information out to more people and entities.

*R. W. Beck Response:*

*We agree with all of the comments received related to this issue, and we concur that outreach and education and the other activities listed that are outside of grants should constitute a large and perhaps growing share of CalRecycle's market development portfolio. The vast majority of our recommendations are directly focused on how this could be done. Just to highlight a couple examples, Recommendation # 7 (page 179) specifically calls for more thorough documentation of cost and performance data; Recommendations #22 through #25 aim at strengthening the effectiveness of outreach efforts, with #25 specifically focused on expanding partnerships. We note, too, that CalRecycle already has extensive partnering arrangements, including with the Rubber Pavement Association (via the current RAC technical assistance contract).*

### **3. PRIORITIZING MARKET SEGMENTS**

**Issues: Should the state identify priority markets at all? What is the purpose? How do the priorities impact state programs in practice?**

Examples of Comments:

- The state has avoided prioritizing markets in the past and we hope that will continue. The concept of prioritizing markets creates a subjective false support for some markets at the risk and potential expense of other quality markets. Why is TDA better than turf, mulch...other leading markets today? The market potential graph on page 22 indicates the civil engineering market at best could consume just over 20 mil PTEs assuming ADC is not considered a viable TDA market.
- No matter how you play with the priority of the markets the fact holds true that some tires will still flow to the lowest-cost option. So as long as landfilling is the cheapest option a certain percentage of tires will go there. If you support and expand other low-cost markets like TDA in an attempt to move tires out of landfills you may not actually get any more tires out of landfills but instead may compromise the supply chain for the higher-end markets, crippling them at their infancy stages, threatening the stability of those markets that in the long run have the most optimal potential.

*R. W. Beck Response:*

*We very much respect the range of perspectives expressed regarding priorities, and we agree that it is not the role of the state to "pick winners and losers." However, we respectfully disagree that this means that no priorities should be established. We feel prudent and effective use of scarce resources requires that the state establish clear goals and strategies for achieving those goals, and that means establishing priorities for how it will allocate its limited resources.*

*We have attempted to clarify the meaning of the priorities by adding the following language (see pages 28 and 170):*

*"It must be emphasized that these priorities are not intended to express any type of value judgment regarding which market segments are more desirable than others. Given CalRecycle's goals to build a diverse market place and to expand demand to allow achievement of the 90 percent diversion goal, the priorities are solely intended to indicate which market segments at this particular moment in time, should be focused on in order to move toward that goal."*



Also, we note the following language in the draft report describing the medium priority market segments:

*“CalRecycle should focus resources on these market segments to ensure continued strong sales and also, to the extent possible, continued growth.” (See page 29 and page 171).*

*Given the state’s emphasis on diversifying markets, and notwithstanding the fact that the ground rubber category is itself diverse, we feel that building demand for civil engineering applications is prudent and need not be done at the expense of ground rubber markets. (See additional related responses below.)*

**Issue: Since ground rubber is a very diverse, market segment in itself, offering high value and a large potential market, shouldn’t we focus on maximizing this potential? Why would the state choose to make civil engineering, a low value market, a higher priority than some ground rubber market segments?**

Examples of Comments:

- Page 164 indicates that the “ground rubber markets” are in a “maturing” product stage which leads me to wonder if the concept of giving it a lower priority as though it is already successful on its own so we don’t need to focus on it. However, if that was the case wouldn’t it already be closer to the potential 40-60 million PTE market potential instead of only being at 9-14 million PTE as shown in the market potential graph on page...? This graph makes it look like with low to medium cost per PTE a great deal of increased market potential could be attained if the state was to put its focus here.
- Figure 3.2 on pg 22 of the report shows that the ground rubber markets have the maximum market potential, with a low of 40 million PTE and high of 60 million PTE. Focusing on this market segment is not putting all eggs in one basket because it is such a diverse market category in itself, and that is not to say the others won’t grow or change also. We disagree with the placement of any ground rubber market as a medium priority below or behind CE markets.
- The market projections for 2015 indicate only an increase from 9 million to 14.4 million PTE into the ground rubber markets. Why isn’t all of our focus going toward getting that as close to the low market penetration level as possible (40 million PTE)?

*R. W. Beck Response:*

*In the CalRecycle strategy chart on page 164 we indicate that, generally speaking, molded products are in a “demonstrated” stage (i.e., with some exceptions, there is much room for continued product development and growth within this broad category), and that the remaining ground rubber categories are generally in a “maturing” stage, meaning they are relatively well developed compared to other segments and in various stages of moving towards the “established” stage. We do not mean to imply that no additional effort is needed. Quite the contrary, we provide an extensive list of barriers to further growth in Section 3. The intent is to suggest that at this particular moment, a greater share of resources should be directed to the market segments identified as top priority in order to make steady progress towards CalRecycle’s goals, while still applying resources to medium priority segments to maintain and continue growth. The strategy chart on page 164 should not be interpreted too narrowly—it is intended to illustrate the general strategy used by CalRecycle and the approximate stage of each market segment.*

*We agree that the ground rubber market category is itself very broad and is worthy of considerable resource allocation. Our intent in identifying RAC and molded products as top priorities was to capture the vast majority of potential growth available, while continuing to maintain and grow the other categories identified as medium priorities. As a result of stakeholder feedback, we are moving bark/mulch to the top priority level as well (see discussion below). The objective is to capture as much of the market growth potential as possible; however, our 2015 projections are intended to estimate realistic projections for what will be achieved by that date.*

**Issue: What is the appropriate role for the civil engineering market in California? Should CalRecycle be dedicating a significant portion of resources to its development?**

Examples of Comments:

- TDA is a dinosaur in the evolution chain of tire recycling, just one step above ADC. Something that states that don't have any tire processors should work on developing. If it is the goal of the state to get more processors then it might have merit. But it doesn't seem logical that the state would spend 10 years building high-end markets and the infrastructure to meet those demands, then go backwards and focus on a lower-value market. Especially when the projections indicate that those high-end markets can get you to your diversion goals. We don't believe that any of the state's crumb processors are going to go backwards and start making TDA in any great volume because we all have significant infrastructure and overhead invested in grinding the rubber down to crumb rubber and making higher-valued end products which will continue to be all of our main focus. Therefore any investment in the TDA market will likely be only marginally successful at best because there won't be adequate supplies to sustain a viable market. That is not to say that it is not a viable market as proven elsewhere in the nation, but we don't need to prove it here again—due to excess aggregate and now other competing markets it will likely be only a small market segment for California going forward.

*R. W. Beck Response:*

*The question of whether to focus exclusively on high-value markets was discussed in great length with CalRecycle. In the end, given CalRecycle's focus on market diversity and diversion, we chose to include civil engineering applications as a priority because of the high potential volume, very low current penetration, and the high level of success with these markets in some other states.*

*Even though ground rubber has potential market size sufficient to achieve the 90 percent diversion goal, we feel it would be highly imprudent to rely exclusively on that, given the potential to grow the TDA market. Moreover, it is not a zero sum game, and we are not recommending that civil engineering growth occur at the expense of ground rubber. Quite the contrary, we are seeking to expand the overall market. Several California processors that do not currently produce ground rubber handle large quantities of California tires, and some have expressed an interest in producing TDA. As demand expands and diversifies, there is always a risk that some tires will move from one established market to another, rather than from landfill disposal. However, we respectfully disagree that expanding relatively low value segments will necessarily lead to shifting tires away from ground rubber.*

#### 4. BARK/MULCH MARKET SEGMENT

**Issues: Is the 2008 estimate of California tires used in the bark/mulch segment too low? Is the potential market size underestimated?**

Examples of Comments:

- The report has undercut the potential of this market segment. The 2008 estimate is way too low, equal to only one firm's production and there are several. Where did the numbers come from? Are only California stakeholders considered or others that are importing as well?
- The growth trends and potential are too pessimistic. Bark is huge on the East Coast though small in the West, but it can grow here, too. Assigning it a flat or declining trend is not accurate.

*R. W. Beck Response:*

*We appreciate the stakeholder feedback on this issue and we have edited the report accordingly. Upon review of data and further discussion with certain processors, we acknowledge that some portion of the market flow attributed to loose-fill playground is actually flowing to the bark/mulch segment. Since the two market segments have the same specification of material, it is understandable that some firms did not segregate the two segments as intended. In the revised report and in future market analysis reports, we are recommending that the two categories be combined. This will be reflected in the 2009 market analysis to be released later in September.*

*We also want to clarify that the market flow estimates reported in CalRecycle Market Analysis reports, including the 2008 estimates quoted in the Program Evaluation Report, reflect only the flow of California generated tires into each market segment. They do not include imported products. Also, they do not include products derived from buffings sourced from retreaders. Consequently, the market flow estimates are not an estimate of the total market size. Since retread tires are already "counted" in the retread market segment, we do not seek to include buffing derived from retreading in other estimates. It is possible that future studies could add this information, but we feel there is a limit to the amount of data that can reasonably be collected in the annual reports, and this may not be feasible.*

*We have also adjusted the market size and current/future penetration estimates based on stakeholder feedback, and moved the bark/mulch/loose-fill segment to the top priority category. Although ADA compliance barriers pose a threat to the loose-fill playground segment, we agree that there is substantial untapped potential in the bark/mulch segment.*

#### 5. TIRE GENERATION AND DIVERSION PROJECTIONS

**Issue: How accurate are the tire generation estimates?**

Examples of Comments:

- We question the total tire generation numbers in 2008, today and as projected. We question the validity of 45 million tires generated today. I think most would agree that tire generation is down almost as much as 20-30 percent due to the economy.
- According to TrueKnowledge the 2010 California population is 36 million and, according to the [Los Angeles Almanac](#), it is projected to be 44 million by 2020. If we still assume 1 tire

per capita (which actually needs to be factored down by about 20-30 percent for the economy) then the numbers in the report appear to be high and/or not completely accurate. Also, how many of the 45 million were in piles and not normal flow of tires?

*R. W. Beck Response:*

*We understand and respect the context for this question, and we acknowledge that there is a significant amount of uncertainty in all scrap tire generation estimates. However, we feel the estimates for 2008 appear to be reasonable. Some clarifications:*

- The estimate in the report is for 2008, so the reduction in generation cited by virtually all market stakeholders that began in late 2008 and strengthened in 2009 and 2010 is not yet reflected.*
- The 2009 tire generation estimate, to be released by CalRecycle in late September, is 41.3 million PTE, down about 8 percent from 2008, and we expect the 2010 estimate will be even lower.*
- As will be detailed in the next Market Analysis report, the estimates include a placeholder value for retreads (of 4.4 million PTE) that has been held steady since 2003. This is likely a significant overstatement of retreading. However, a suitable standard methodology for estimating retreads is not yet in place but will be tested for the next study covering 2010.*
- Many organizations, including the RMA, do not define used tires or retread casings as scrap tires and do not include them in their estimates. We feel the most thorough documentation of the number of tires generated per capita in California is from a 2006 CalRecycle-sponsored Sacramento State University study that estimated waste tire generation in California (including retread and used tires) at 1.24 tires per capita. Using that rate, with 36 million people, the total generation would be 44.6 million tires, pretty close to our estimate.*
- The generation estimates cited in the CalRecycle market analysis reports are based on the flow of tires handled by processors and large haulers. It is possible that a portion of these tires is derived from local amnesty days and tire pile cleanups; however, we believe this would constitute a very small percentage of total flow at this time.*

*Regarding the projected increases in tire generation discussed in the report, we acknowledge a high level of uncertainty due to potential shifts in the economy, population, and other demographic factors. However, we feel the specific estimates used in the report are sound for the purposes of illustrating the need to continually expand diversion in the future, especially as the economy rebounds and waste tire generation again increases. For context, we note that tire shipments have in fact increased sharply recently, and the RMA has upgraded its sales forecast for 2010 to reflect an 8 percent increase in sales. This would bring 2010 sales back up to the sales level seen in 2008.*

**Issue: How should tire diversion be calculated? Is 90 percent diversion a reasonable goal?**

**Examples of Comments:**

- If your projections are right your diversion goal for 2010 would be 47.7 mil PTE to be at 90 percent, which will be difficult to reach since 15-20 percent of most tires are fluff and as of now there are no markets for fluff so that may need to be addressed if we are ever to reach 90*

percent. In reality if only 80 percent of the tire is truly recyclable (assuming fluff is not), then 90 percent of that 80 percent is 72 percent which is where we are now! I think as a state we can say that 90 percent of the state's tire rubber is diverted. Markets for the 15-20 percent of the tire that is fluff could push it right up to the absolute limits!

- The other picture to look at is the trend of tires to all non-landfill markets over the past 10 years. This would then place ADC in with landfill and really show the true picture of the progress that has been made by the state and its tire programs over the past 10 years.

*R. W. Beck Response:*

*We must clarify that the diversion rates discussed by CalRecycle for tires are based on the number of whole tires entering a processor and used to make ground rubber or other products, or to flow to other non-landfill locations. In short, CalRecycle diversion estimates have never been adjusted for residuals such as fluff or steel. This is also true of RMA's market studies and those of many other states. As part of the annual market analysis reports we have sought to gather detailed data on quantities of fluff and steel and how they are managed, but with mixed results to date. We feel it is a level of detail that is difficult to achieve across all firms given the voluntary reporting structure.*

**Issue: What happens if TDF rule materializes and you lose the cement TDF?**

Examples of Comments:

- The proposed EPA rule is likely to be adopted, and I doubt that many cement plants if any will continue using tires as fuel given the added costs for permitting alone.

*R. W. Beck Response:*

*The program evaluation report was based on market analysis conducted in late 2009. As it increasingly appears likely that the U.S. EPA's proposed rule redefining TDF as solid waste will be enacted, there is a very strong possibility that at least some, if not all, of the current demand by cement plants using whole tires as fuel may disappear. Currently, in 2008, this could affect approximately 5.7 million PTE of demand (which is low compared to previous years); however, the future impacts could be even more significant as there is considerable room for growth in this amount of TDF used by California cement plants, especially as the economy rebounds in coming years. We hope that that program evaluation report has provided CalRecycle and stakeholders with a sound framework for considering options should this unfortunate turn of events materialize. We would expect an increase in disposal in such an event.*

**6. CALRECYCLE PROGRESS TO DATE AND OVERALL NEED FOR ADJUSTMENTS**

**Issue: How effective has CalRecycle's approach to date been and how much change is needed?**

Example of Comments:

- We didn't feel that the report gave enough credit to the many programs that the state has successfully run for the past 10-plus years that really have led to the successes that we have today as an industry. The equipment grants in the early years and the more recent business assistance program alongside the TDP and RAC grants have all been instrumental in the migration of the market to where it is today. We really don't think too much is broken and therefore very little needs to be fixed. We are confident that as the ground rubber markets continue to mature thru ongoing market development efforts with even more emphasis on

education and outreach that they will push diversion to its maximum limits in the next 5-10 years.

*R. W. Beck Response:*

*We agree that CalRecycle's efforts have been successful and that, on the whole, not much is broken and very little needs to be "fixed." Our report is intended to provide a systematic framework for evaluating and considering options, and to assist CalRecycle in continuing to optimize its programs.*

**Issue: Should CalRecycle pursue the identified policy options?**

Examples of Comments:

- We don't see much benefit from the two policy recommendations especially given the effort it would take to implement them. The "other policy recommendations" would have positive impact but it sounds like those are not being recommended because they are such long shots.

*R. W. Beck Response:*

*We respectfully disagree with the sentiment that pursuing the two recommendations is not worth the effort. In our opinion the effort involved would be minimal and potentially could have important results. TDF is an important market that may be severely impacted by the proposed EPA rule. While CalRecycle can comment on the rule, it is not currently allowed to research or address TDF in any way. Seeking approval for use of TDA in septic systems could unlock a significant future market with not insignificant value, and the cost of "weighing in" on this is not significant. It is true that we did not recommend the more aggressive policies such as seeking local requirements to use RAC in part because of the likely political infeasibility. However, the deciding factor for us was the risk that pushing for such a mandate could backfire by causing undue scrutiny of the tire fund, which so far escaped action by a revenue starved legislature. A further factor was the inability to gather detailed data on the potential cost impacts of such a mandate under the time and resources available to the project.*